



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

*Remarks on the Form of Numbers, the Method of Using them, and the Numerical Categories found in the Mahābhārata.*—By E. WASHBURN HOPKINS, Professor in Yale University, New Haven, Conn.

THESE Remarks on Numbers are incidental notes which I made a short time ago, while collecting from the great Hindu epic some material intended for another purpose. They were presented in outline as one paper at the meeting of the Society in April of this year, but as they are rather too long to be printed all at one time in the *Journal*, I purpose to bring them out in sections in successive half-volumes. The general plan of arrangement is as follows:

The form of epic numbers.

How numbers are handled in arithmetical processes.

How space (dimension, etc.) is measured (norms and syntax).

Time-words and methods of measuring time (months, asterisms, etc.); syntax of time expressions; time-phrases; age; epic dates (excursus).

The epic world according to the categories of the poets (physical, ethical, etc.).

Various problems, historical as well as philological, serve to relieve the dryness of the subject, but these will be touched only by the way, as my chief object is to get data together, though I have not avoided mention of obvious differences in matters pertaining to the growth of the epic. The present paper includes the first three divisions. The next will treat of time-words (to epic dates), with subsequent divisions according to circumstances.

Before taking up seriatim peculiar forms of numbers, I would call attention to certain fanciful number-words which belong to the later epic. The most striking of these is *daṣārdha*, not merely as “five,” *daṣārdhasaṁkhyāḥ* (*ṣarāḥ*), i. 188. 20; *daṣārdhahavirātmakaḥ*, xii. 47. 42,<sup>1</sup> but as “fist” (the half-ten fingers):

---

<sup>1</sup> Compare the abstract, *daṣārdhatā=pañcatva*, xii. 187. 27, dissolution into five elements (ib. 291. 10, *daṣārdhapravibhaktā*).

xii. 114. 20, *kruddho daṣārdhena hi tāḍayed vā*.

Analogous is *pañcaṣāḥka*, "having five branches," the hand:

xi. 17. 30, *svaṣīraḥ pañcaṣāḥbhyaṁ abhihatya*,

which illustrates Nala v. 5. In the Rāmāyaṇa, vi. 59. 55, this word is still an adjective to *bāhu*. Compare RV. x. 137. 7, *daṣaṣāḥbhyaṁ (hastābhyaṁ)*.

I have elsewhere suggested that the word for four appears to be a combination of "three and." That the digits, as well as the higher numbers, were indicated by addition is shown by many examples of "and" combinations to express them, for example, in i. 234. 15, six is expressed by "five and one," *pañca cāi 'kaṁ ca*. Double-six (*ṣaṭka* for six) reflects a common doublet, the year consisting of two six-month "courses" of the sun, *dviṣaṭkapadagāmin*, xi. 5. 15. Such "double" terms are not rare: "double-five-headed," *dvipañcaṣīrasaḥ kecit*, v. 103. 7; *dvipañcarātra*, iii. 230. 37; *dviṣaḍakṣa*, "with twelve eyes," xiii. 86. 19; while for twenty-one, "thrice seven" is normal, *trisaptan*, sic, *triṣaptakṛtvāḥ*.

I have no record of alternate adjective numerals, such as *dvitira* or *tricitura* among epic material; but unexpressed alternates are found: "five or six mouthfuls," *pañca ṣaṭ*; "for seven or eight days," *saptāṣṭa divasān*, v. 160. 40; "even (opposed to fifty) five or six or seven," *api vā pañca ṣaṭ sapta*, vi. 3. 83, also xii. 102. 21; "of ten or twelve" (years), *daṣadvādaṣa*, iii. 188. 60. Compare *dvyeka*-, "of two or of one," Manu, x. 7. For triad, *tritayam* and *trayam* (in i. 2. 329, etc., *ṣatatra-yam*) are used indifferently; in xiii. 111. 18-19, side by side:

*dharmas cā 'rthaṣ ca kāmāṣ ca tritayam jīvite phalam  
etat trayam avāptavyam.*

This is the usual triad to be desiderated, but it is often alluded to as a triad without definition, as in ix. 64. 21, *tritayam sevī-tam sarvam*. It is possible that it means trinity in xiii. 147. 53, where Īva says of Viṣṇu:

*tatra ca tritayam drṣṭam bhaviṣyati na saṁçayaḥ  
samastā hi vayan devās tasya dehe vasāmahe,*

though even here it may, as usual, be equivalent to the *trivarga* called *tritaya* above (rather than the three times, as suggested in PW.). *Tretā* for triad is rather affected in the later epic

and (without the implied complement) stands alone for a Yuga and for the group of three fires (ref. PW.); *trika* is used sparingly, *pañcatrika*, having a triad of five, fifteen; *tritva* is a late solecism (ref. below). A group of four is *catustayam* or *catuṣ-kam*; a group of five, *pañcakam*, etc.

Metaphorical number-names I have illustrated by a passage cited in my *Great Epic*, p. 206, where *ṣarāgni* is  $5 \times 7$ . The passage, however, is late and unique in the epic.

I turn now to the regular numbers.

The epic is not so careless of art as to change the grammatical form of all the numbers, but it contains several abnormal numerals. I shall speak of the form of the numbers three, four, seven, eight, nine, ten, adding something on derivatives of the word for one, and the use of the higher numbers.

**Tri.** In the Sanatsujāta Parvan, which is a late imitation of ancient matter, occurs this verse :

v. 43. 15, *tathā nṛṣaṅsāni daṣa tri, rājan.*

In ṣl. 19 are mentioned seven cases of cruelty, which apparently led Telang, *SBE.*, viii. p. 168, to translate the words above “and likewise the seven cruelties.” But the seven of ṣl. 19 are expressly differentiated from six that precede, *ete pare sapta*, “seven other cases,” and it is these six and seven together which make up the thirteen, *daṣa tri*, mentioned in the introductory fifteenth ṣloka. Consequently, Nīlakaṇṭha is right in saying that *daṣa tri* is for *trayodaṣa*, or, in other words, *tri* heré stands for *trīṇi*.

In the last number of this *Journal*, xxii, p. 345 ff., I pointed out an epic case of a dropped ending, *daṣa-dvādaṣabhir vā 'pi*, where the *vā* shows clearly that *daṣa* stands for *daṣabhiḥ*, which has lost its ending because it is supplied by the next word.<sup>1</sup> A still more extraordinary case of dislocated ending is found in that book which historical critique has pronounced later than the early epic:

iv. 62. 14, *avaruddho 'carat Pārtho varṣāṇi tri daṣāni ca,*

---

<sup>1</sup> The meter here shows that the corrupt form is intentional. The case differs, therefore, from that of the ÇB. *yajus*, *Mitrāya Varuṇāya ca*, which all MSS. of JB., Professor Oertel informs me, have as *Mitrā-varuṇāya ca*, since the latter form spoils the meter.

where *tri daṣāni* stands for thirteen. Here we cannot read *tri-daṣāni*, for two reasons. First, this word means thirty and not thirteen, and thirteen is the required meaning. Second, even if we took *tridaṣāni* as an adjective meaning thirteen, there would still remain the *ca*, which only a very strained interpretation could dispose of otherwise than as Nīlakaṇṭha has said (*trīṇi ca daṣa ca*). There remains only the explanation that in *tridaṣāni* the poet has transposed the endings for metrical purposes and not only written *tri* for *trīṇi* but *daṣāni* for *daṣa*, helped thereto undoubtedly by the preceding *varṣāṇi*. Such a monstrosity is one that need not surprise us among the many evidences of lateness found in the Virāṭa, which, as a whole, lies nearest to the pseudo-epic in its disregard of Sanskrit grammar as in other particulars. So in Virāṭa we find the slovenly construction of iv. 39. 10, *jītvā vayanṁ neṣyati ca 'dya gāvaḥ*, "conquer us and carry off the cows," a verse admitted by Nīlakaṇṭha (compare 47. 34), and quite comparable with the looseness of form found in Ṣānti.

The PW. has already noticed, i. 113. 21, *vihr̥tya tridaṣā niṣāḥ*, for *triṇṣat*; *tridaṣāu*, iii. 123. 1 (*Aṣvināu*); and *tridaṣāḥ*, 3×10 (=33) gods, *passim*.

**Catur.** Professor Holtzmann, in his *Anhang* to Whitney's *Grammar*, § 482, mentions *caturaḥ* as nominative in xii. 24. 27 and *catur* as accusative, *vedān*, in iii. 45. 8. Both forms are found elsewhere as well. In vii. 149. 22, *gāyanti caturo vedāḥ*; vii. 202. 74, *vedān kṛtvā 'tha caturaḥ catur aṣvān maheṣvaraḥ*. Also in viii. 34. 70, *tathāi 'va vedāḥ caturo hayāgryāḥ*. All these passages are late laudations or describe metaphorical "cars" of religion, the four Vedas being made the steeds. Unique is viii. 20. 49, *sa tu dvipaḥ pañcabhir uttameṣubhiḥ kṛtaḥ ṣaḍaṇṣaḥ caturo nṛpaḥ tribhiḥ* ("the elephant with five arrows made six-fold [cut into six pieces] and the king with three (arrows made) four"), *kṛto daṣāṇṣaḥ kuśalena yudhyatā yathā havis tad daṣa-dāivataṁ tathā* ("was made ten-fold [cut into ten pieces] by the skillful warrior, like an oblation offered to ten divinities").

Here *caturaḥ* is plainly *caturāṇṣaḥ* in sense, but as to the form, it is difficult to say whether by analogy with late compounds in *catura* it is nominative singular, or by analogy with "make one four" accusative plural, or by analogy with the cases above, nominative plural. I think it belongs to the last

group, "made-six-fold, made four." The awkward sentence means as a whole that the six parts of the elephant and the four parts of the king were like an oblation cut into ten parts.<sup>1</sup>

**Saptan.** By analogy with the cases already mentioned it may be suspected that *sapta* stands for *saptasu* in xii. 343. 106, where Kaṇḍarīka is said to have arrived at Yoga-perfection because of his excellence, *mukhyatvād*, "reflecting often on the sorrow caused by birth and death, *saptajātiṣu*." The commentator says "the sorrow of seven births," *sāptajanmikam*, which would imply "in seven births," and not the compound "among those having seven births," which is the natural interpretation. As to the meaning, it is probably the indefinite sense of "many," which in most examples is hard to verify (i. e. to show that 'seven' is used without any reference to a fixed number). For in "seven paces," "seven flames," "seven seers" and "seven rivers," seven, for all we know, may have been intended literally. There are two cases, however, where *saptan* clearly means "many" simply; once where, instead of elephants *tridhā prasravantaḥ* (an oft-repeated phrase), we find *saptadhā*; for the parallel *sarvataḥ* is used in the same way:

- i. 151. 4, *trihprasrutamadaḥ*,
- vi. 64. 58, *tridhā rājan prasravanto madam bahu*,
- vii. 26. 6, *kṣarantaḥ sarvato madam*,
- vi. 95. 33, *saptadhā sravatā madam, parvatena yathā toyam sravamāṇena sarvaçaḥ*.

The second case is where *bhuvanāni viçvā* interchanges with *bhuvanāni sapta*, or, in the gender of the later epic, *bhuvanāḥ sapta* (see hereafter).

**Aṣṭā.** The final vowel is short or long according to metrical convenience, long when the length is indifferent:

- iii. 102. 3, *açitiḥ çatam aṣṭāu ca nava cā 'nye*,  
*aṣṭāu* required by the meter;

- vii. 146. 134, *akṣāuhiṇīr aṣṭa hatvā*,  
*aṣṭa* required by the meter;

---

<sup>1</sup> The *havis* called *daçadāivatam*, represented here by *daçāṇça* (the man and elephant together) "in ten parts," is called *daçāṇço homaḥ* in xviii. 6. 105.

- xiii. 111. 69, *bhūtā mīno 'ṣṭa varṣāni*, also required.  
 v. 86. 9, *daṣā 'ṣṭa ca*, and vii. 82. 8. and 16, *ṣaṭam aṣṭa ca*,  
 cases of diiambus, brevis required;  
 ix. 46. 74, *mahiṣam cā 'ṣṭabhiḥ padmāiḥ*,

short vowel required;

- viii. 22. 6, *aṣṭābhīr api, Bhārata*,  
 long vowel required; ib. 17, *Nakulāya ṣaṭāny aṣṭāu*, indifferent.  
 Respecting the alleged difference between *aṣṭāgava* and *aṣṭa-*  
*gava*, PW. i. 531, there are two verses, one of which is

viii. 67. 6, *aṣṭāgavām aṣṭa ṣaṭāni bāṇān* (sc. *vahanti*),  
 which Nīlakaṇṭha interprets as “eight eight-cow wagons carry  
 hundreds of arrows,” his *teṣām aṣṭāgavām* implying a short  
 genitive modelled on *gavām* (*aṣṭāu gāvo yasmiṃś tad aṣṭāga-*  
*vaṃ ṣaṭāni teṣām aṣṭāgavām aṣṭa aṣṭasaṃkhyāni ṣaṭāni,*  
*nudabhāva ārṣaḥ, ṣaṭāni bāṇān aneṣaṣaṃkhyān vahanti*).  
 One is tempted to read *aṣṭāgavāny*, as in the next passage,  
 which, however, has the short vowel:

- viii. 20. 30, *aṣṭāv aṣṭagavāny ūhuḥ ṣaṭāni yad āyudham*  
*ahnas tad aṣṭabhāgena Drāṇiḥ cikṣepa, māriṣa,*

“Droṇa’s son, Sir, threw as many missiles in an eighth of a day  
 as eight eight-cow wagons carry,” which repeats with elaborate  
 definiteness the statement of the preceding verse that the hero  
 poured arrows as Pūṣan’s “younger brother,” Pūṣānuja, that is  
 Parjanya, pours rain. The scene is late and instructive for the  
 critique of the epic. The hero here particularly lauded is a cer-  
 tain Pāṇḍya, quite unnoticed previously but now extolled as the  
 ablest warrior on the Pāṇḍu side. It is he who, as explained  
 above, is quartered and made with his elephant a ten-fold obla-  
 tion. There appears to be no grammatical difference between  
*aṣṭāgava* and *aṣṭagava*.<sup>1</sup>

In regard to *aṣṭacakra*, the Petersburg lexicon gives only the  
 Vedic *aṣṭacakra*, but *aṣṭacakra* is found (of Hari’s wagon,  
*yāna*) in vi. 8. 16; xii. 335. 11; and (of a demon’s car, *ratha*)

<sup>1</sup> Compare for these compounds, *hastiṣaḍgava*, viii. 38. 7, of a war-  
 car, and *ṣaḍgavīyaṃ ṣaṭam*, ib. 76. 17. In xii. 37. 32, sixteen cows  
 are yoked to a war-car.

in vii. 156. 61; 167. 38; 175. 13; and (of an *aṣṇi*) in vii. 175. 96. In the first three Droṇa cases, *samāyukta* is added, a set formula. In the first case, from Bhīṣma, the word also begins a *pathyā* and the whole verse is repeated in the next Čānti case, *aṣṭacakram hi tad yānam bhūtayaktam manoramam*. As the last case, too, stands at the head of a *pathyā* and in this situation *aṣṭacakram* would be metrical, the choice must be due to preference for the later form.

**Nava.** The Vedic phrase *jaghāna navatīr nava* I have already, *Journal*, vol. xxii. p. 389, located in the epic, ii. 24. 19. To this example should be added also the same phrase occurring at ix. 51. 36 and xii. 22. 11. The last is farthest removed in context from the original, while the passage in Čalya gives the Vedic text very closely in making the weapon the bones of Dadhīca (epic form):

RV. i. 84. 13, *Indro Dadhīco astabhīr vṛtrāṇy apratiṣkutaḥ  
jaghāna navatīr nava,*

Mhb. ii. 24. 19, *yena (rathena) Čakro dānavānām  
jaghāna navatīr nava,*

ib. ix. 51. 36, (*Dadhīca, tasyā 'stibhiḥ*) *dāityadānavavīrāṇām  
jaghāna navatīr nava,*

ib. xii. 22. 11, ("Indra the son of Brahman became a Kṣatriya  
by his acts and") *jñātīnām pāpavṛttīnām  
jaghāna navatīr nava.*

In each case (but the first is not annotated) Nīlakaṇṭha says that the number is (not ninety-nine but) eight hundred and ten (nine nineties). In i. 32. 24, *navatyā navatīḥ (kṛtvā)*, v. 1. *navatyō*, the multiplication is definite, 8100.

To the forms recognized in grammars and lexicons I am tempted to add *navāiḥ* as instrumental plural. Otherwise we must assume that *new* arrows are especially used when their number is ninety, whereas generally there is a natural predilection for such conjuncts as six and sixty, seven and seventy, and nine and ninety. So by analogy with *navatyā navabhiḥ ca* in viii. 30. 25 we find *navāir navatyā ca čarāiḥ* in viii. 90. 60. At the same time, "nine" and "new," owing to their like sound, are found together, as in viii. 48, 50, *navāir navabhīr āyasāiḥ*, but in the case above *ca* seems to show that *navāiḥ* is a numeral.



I would remark, by the way, on the partially formulaic character of most of the shooting in the battle-scenes. The test of an archer's skill is not only to shoot one arrow well but to shoot many arrows at once. Among digits the object shot at determines, for the main part, the number of arrows used. With four arrows one shoots the four steeds; with three, the arms and forehead or the three charioteers, etc. But even here there is an occasional irruption of eights, the favorite number of the later epic. Thus in viii. 89. 63, ten and eight; 65, eight; 68, eight hundred and eight thousand; 76, eight; all in a bunch, though up to this passage the whole preceding eighty odd sections show only half a dozen cases. So in the late wonder-tales of the first book, larger numbers are by preference expressed in terms of eight or its multiples, e. g., i. 100. 20, to express thirty-six years, "years sixteen and eight and also four and eight more." I shall have occasion in a later section of this paper to show how this Buddhistic number has driven out the more ancient holiness of nine.

In the "down-pour" of arrows said to be shot by decades there is a certain preference for stereotyped groups. Twelve, fourteen, fifteen, and sixteen are shot more often than seventeen and eighteen. Twenty-one, *trisaptan*, is a favorite for the same reason that endears *trisaptati*, as three and seven(ty) are sacrosanct numbers. In this decade, twenty-five is also a favorite, while twenty-seven is the rarest; in the third decade, thirty-six is the conventional number, with a few cases of thirty and thirty-two. The fourth decade is almost ignored; the fifth appears rarely as fifty; then come sixty and six and sixty (less common are three and four and sixty); seventy and seven and seventy (less common are two and three and seventy); eighty (rare); ninety (nine and ninety as above); and occasionally one hundred, three hundred, five hundred, and even ten thousand arrows all discharged from one bow at one shot!

**Daça.** The *dāṣatā* of vi. 2,700 (rightly condemned in PW.) is replaced in B. 61. 21, by *triṇṣatā*. The epic has *daṣati*, analogous to *saptati*, *navati*, not as decade but as one hundred (as who should say "ninety, tenty"), the form, however, being formulaic like *navatīr nava* (above), and probably a new formation, as it occurs only in the later part of the epic. The decisive cases as regards the meaning are (i. 16. 8-13 and) v. 108. 14, the latter:

*Oṃkārasya 'tha jāyante sṛtayo daṣatīr daṣa,*

where a "thousand branches" is Nīlakaṇṭha's undoubtedly correct interpretation. In xiii. 30. 21, the ten might be decades or hundreds (of days), though here also Nīlakaṇṭha admits only the latter and says the word is *Analogie-Bildung*.<sup>1</sup>

Holtzmann, *op. cit.*, § 483, has spoken of *saptadaṣeṣu* at iii. 268. 11. I think Nīlakaṇṭha's explanation (having eight royal acts and nine *siddhis* and *śaktis*) is quite inadmissible. Families "having seventeen" would be more likely to be thought sinful than virtuous. Compare the "seventeen fools and sinners" of v. 37. 1-6. Then in v. 36. 22, the "great families" are defined as those which *ete sapta-guṇa vasanti*, "seven virtues" being their possession, which suggests *saptaguneṣu* as the right reading. But here the meter alone is enough to change *saptadaṣasu* to *saptadaṣeṣu* (*vayam punaḥ saptadaṣeṣu Kṛṣṇe kuleṣu sarve 'navameṣu jātāḥ*).

**Higher numbers.** Nineteen is not *navadaṣa* in the epic but, as in Latin undeviginti, *ekonaviṇṣati*.<sup>2</sup> In xiii. 107. 87, *ekonaviṇṣat* serves as an ordinal, *ekonaviṇṣati dīne* standing parallel to *ṣoḍaṣe*, *saptadaṣame*, *aṣṭādaṣe*, and *pūrṇe viṇṣe* (*divase*). At C. xi. 561, *pariviṇṣat* offers a form parallel to *triṇṣat* (also *triṇṣati*); but B. 19. 15 has *paçya Kṛṣṇa for pariviṇṣat* (*Viviṇṣatim*). In i. 2. 330, B. has *viṇcat*, C., *triṇcat*; ib. 379, *viṇṣac chlokaçatāni*. The late Rāmāyaṇa also admits *viṇṣat* in *ekaviṇṣat* (ref. PW.). The epic accusative of the following decades is frequently identical with the nominative; for example, in i. 86. 15, *abhakṣaḥ çaradas triṇṣat*, either form doing duty for either case. Examples of *triṇṣat* and *pañcāçat*, as accusatives of object and duration respectively, are given below, and in xiii. 168. 5 and 27, respectively, *pañcāçat* is accusative, *çarvarīḥ pañcāçat*, and *pañcāçatam* is nominative, *aṣṭapañcāçatāni rātryaḥ çayānasyā 'dya me gatāḥ*, as in the further case cited below. The corresponding ordinals in the text (the *adhyāyas* are counted by *-tama* forms as well) are short, *ekaviṇṣa*, *dvāviṇṣa*, *trayoviṇṣa*, *caturviṇṣa*, *pañcaviṇṣa*, *ṣaḍviṇṣa*, *saptaviṇṣa*, *aṣṭaviṇṣa*, *ekonatriṇṣa* (compare *ekonasaṣṭi*, *ekonasaṣṭati*, i. 2. 204, 289, etc.), xiii. 107. 93-121.

<sup>1</sup> For thousand the later epic uses *daṣaçatam*: *tathe 'śtīnām daṣaçatam prāpnuvanti*, xiii. 102. 36, etc. (meter, *Great Epic*, p. 305).

<sup>2</sup> Or *viṇṣatir ekonā*, vi. 4. 15.

Before leaving this subject I would say a few words on certain declined forms of *eka*, not because they are irregular as forms, but on account of the way they are used. The first point is the parallelism between the adverbial ablative and the instrumental, as shown in

v. 43. 21, *tribhīr dvābhyām ekato vā 'rthito yaḥ*.

According to the commentator, *arthita* here means possessed of or furnished with, *artha*, a meaning not usually recognized, but in accordance with the sense of the passage, which says that one who has in his power all the twelve virtues is fit to rule the earth, while "he that is furnished with three, two, or one," is to be known as one having wealth, *tasya svam asti 'ti sa vedī-tavyaḥ*. In any case, *ekataḥ* is used freely here as a correlative of the instrumental.<sup>1</sup>

The same form has a meaning almost recognized in the Pet. lexicon, which ascribes to it, besides the ablative sense and that of "on the one hand," the meaning of "together," or "in one." By a slight extension of meaning *ekataḥ* means altogether, solely, or, quite literally, one-ly, only, as in vi. 107. 20,

*yathā prajvalitām vahnīm patanḡgaḥ samabhidhravan  
ekato mṛtyum abhyeti tathā 'ham Bhīṣmam iyivān,*

"As an insect entering a blazing fire meets only with death, so I, on having encountered Bhīṣma." This, at least, is Nīlakaṇṭha's exposition, who takes the word as equivalent to (*ekaṁ*) *kevalam*, *mṛtyum eva*, rather than as contrasting the insect "on the one hand" with the speaker. The plural *eke* meaning "alone" may be used as well as the singular, *nāi 'ke 'gnanti susampannam*, "eat dainties alone," xii. 228. 44.

Examples of the correlation by two *ekataḥ* are not uncommon. One is found in

xii. 12. 12, *ekataḥ ca trayo rājan gr̥hasthācrama ekataḥ,*

where against the other three orders is weighed that of the householder, which is said to be equal to all the others put together.

---

<sup>1</sup> For the usual meaning if applied here would be "he who on the one hand is furnished with three or two." Compare the parallel use of *prathamataḥ* in xii. 82. 1, *eṣā prathamato vṛttir dvitīyām gr̥ṇu, Bhārata*.

In the following stanza I think we may see an extension of Vedic usage surviving in the epic:

- xii. 21. 7, *anye sâma praçañsanti vyâyāmam apare janāḥ*  
*nāi'kaṁ na cā 'pare kecid ubhayam ca tathā 'pare.*

The commentator admits the double negative as an affirmative and according to him the stanza would mean: "Some praise mildness, others praise a strenuous life, still others praise the one (Yoga-discipline, *dhyāna*), and others again praise both." But, although the affirmative double negative is not an impossibility, it carries with it a strength of affirmation<sup>1</sup> that is quite uncalled for in this passage, where *ekam* certainly has no right to be represented by *dhyānam*. In the continuation it is said that some sit in quiet meditation, some are active in governing, and others are *ekāntaḥ*, which may have led the commentator here to set up a third object of devotion. But with the antithesis of *ubhayam* there can be no doubt that *ekam* is one of the two already mentioned, and the meaning to be expected is that some praise mildness, some praise energy, some praise neither, and some praise both; which, in my opinion, is what the passage was intended to mean when it was first written. In other words, for *nāi'kaṁ na ca*, we should read *nāi'kaṁ ca na*, which preserved the old phrase found in BAU. vi. 2. 2, *nā 'ham ata ekaṁ ca na veda*; ib. 3, *tato nāi'kaṁ ca na veda*. Otherwise *na ca na* survives only in indefinites, *na katham ca na*, etc. The sense of *nāi'kaṁ* as "many a" is here excluded. This latter meaning is common, e. g., *nāi'kaṁ yugaviparyayam (avasam)*, "many an age," xii. 229. 49.<sup>2</sup>

<sup>1</sup> It is used, however, generally, where two clauses are distinguished, e. g., *na cāi'va na prayuñjīta, saṁkīrṇam parivarjayet*, "not that one should not commit (these faults, but) one should avoid excess," xii. 56. 42; or in strong affirmation, *na sa yajño na bhavitā*, i. 38. 2, "it will surely occur;" *naḥi tvām no 'tsahe hantum*, xii. 227. 80, "assuredly I can kill thee." Compare the parallel in the same scene (repeated) in xii. 224. 38, *evam nāi'va na cet kālāḥ . . . pātayeyam ahaṁ tvā 'dya*, "I could kill you now; if it were not so, if Time did not (prevent)." Compare xii. 239. 4-6, ending *etad evam ca nāi'vam ca na co 'bhe nā 'nubhe tathā*.

<sup>2</sup> In xiv. 49, a similar but longer string of opinions is given by *kecit*, *anye*, *apare*, and *eke*, indifferently, ending with çl. 12, *sarvam eke praçañsanti na sarvam iti cā 'pare*, "some praise everything and others nothing."

In regard to the choice between *eka* or *ekatara*, the epic uses either, as in xii. 81. 9, *vṛṇomy ekataram na ca*; 10, *ekasya jayam ācāṁse*, ("like the mother of two gamblers) I prefer neither, hope for victory of the one." In i. 119. 15, *vāsyāi 'kam takṣato bāhum candanenāi 'kam ukṣataḥ nā 'kalyāṇam na kalyāṇam cintayann ubhayos tayoh*, "not thinking ill or good to appertain to [these both] either of these, him cutting one arm with an axe and him anointing one with sandal-paste" (for *anyataram*). In triads, one, another, and a third, *anya*, *apara*, *para*; *eka*, *apara*, *eka*, and so forth, xii. 86. 30; 137. 4. Though *katara* is used quite regularly, *kim* may take its place, as in xii. 126. 16, where, after two are mentioned, we find *kiṁ nu jyāyastaram*, "which (of these two) is more greater?" So *katama* and *ka*, xii. 167. 2.

On the form of other epic numbers I may refer to what has already been given in the Petersburg lexicon and in Professor Speyer's *Sanskrit Syntax*. I will only register another *pañcāṣṭam* (*guṇāḥ proktāḥ*) for *pañcāṣat*, xii. 256. 8, and observe that *dvīsaptati* appears in Manu, vii. 157, but epic *dvāsaptati* (in the same passage) at xii. 59. 71; at the same time remarking as to *ṣatā* for *ṣatāni*, in iii. 67. 6, where C. has *ṣatām ṣatāḥ*, that masculine *ṣata* belongs to the more recent parts of the epic, whence *ṣatā*, like *viṣvā*, may have been the original. As to the feminines, *triṣṭi*, etc., which have been noticed by Speyer, *op. cit.*, § 294, these forms are also late in the epic, *triṣṭi* and *saptāṣṭi* (i. 2. 324) and cognate forms are found in still later works. Further: besides *daśaṣṭam*, above (and *daśasāhasram*), "a ten-hundred," there is the uncommon unpounded singular form (as if plural), as in xiii. 112. 14-15, where, parallel to *daśaṣṭam vedavidām* (in ḡl. 28), appears *brāhmaṇānām ṣatām daśa*.

The question as regards appositional construction may be discussed here though it pertains to syntax rather than to form. All substantive numerals may take this construction, *sahasram parivatsarān*, i. 94. 41, etc., which is not irregular if we understand "years, a thousand," rather than "thousand (of) years." But with the higher numbers the noun is usually either compounded, *varṣāyutāni*, etc., or is in the genitive, *puruṣamedhānām ayutam*, i. 95. 20.

The particular example just given has indeed a sort of stereotyped form, especially when "eleven thousand years" are referred to. As one says *bahuvarṣagaṇān*, "many year-rows," e. g. xiii. 111. 98, so one says year-hundreds or thousands, *pañcavarṣagata*, etc., and uses a formula with eleven, ten thousand and ten hundred: *daṣa varṣasahasrāṇi daṣa varṣaśatāni ca*, iii. 12. 12; *daṣa kalpāyutāni*, ib. 200. 121. A modifying number is placed in the same construction, as a general thing, *ayutāni pañcāśat* (accusative) with genitive, xiii. 107. 31; *yud-dhān varṣasahasrāṇi dvātriṅcat abhavat kila*, "the war (of the gods and their elder brothers, the devils) lasted thirty-two year-thousands," xii. 33. 26. But here also a genitive is often found (more correct), *dve yugānām sahasre*, xiii. 107. 113, etc., and an inverted order, as in *ṣatavarṣa*, not as adjective but noun, is permitted, *vāyasaḥ ṣatavarṣāṇi (jīvati)*, xiii. 111. 86 (compare *ṣataṣṭradam*), in this instance due, perhaps, to the meter (to avoid a third *vipulā* after a trochee), but found also ib. 118, *kṛmīr viṅcativarṣāṇi*. The very unusual construction found in i. 90. 1 is probably due to meter also. Here we have *saṁvat-sarānām ayutaṁ ṣatānām*, "a ten-thousand of hundred years." Close by occurs another case of apposition, i. 93. 24, *tadā 'dadam gāḥ ṣatām arbudāni*, "then I gave cows, a hundred hundred-millions."

An adjective may or may not agree with the implied genitive; both together, for example, in iii. 127. 2 and 13, *bhāryāṣatām sadṛṣṇām* and *sadṛṣam*. Possessives, by the way, put the numeral either first or last, with possessive ending, *daṣagu*, *sahasragu*, *goṣatin*, xiii. 78. 11. Compare with the last, ib. 102. 43, *yo gosahasrī ṣatadaḥ samān samām, gavām ṣati dadyāc ca*.

In regard to the syntax of decades, both genitive and apposition are common, and, beginning with *viṅcati*, we find, for example, *saṁsārān viṅcatim*, xiii. 111. 117; *triṅcat agnīm (ayaṣam)*, xiii. 103. 36. An interesting case historically is found in xii. 335. 35-37, *ekaviṅcatir utpannās te prajāpatayaḥ smṛtāḥ*, not only because "twenty-one Prajāpatīs" are late-epic, but because in the twenty names given as those of the sons of Nārāyaṇa one has been left out, the list being Brahman, Sthāṇu, Manu, Dakṣa, Bhṛgu, Dharma, Yama, Marīci, Aṅgīras, Atri, Pulastya, Pulaha, Kratu, Vasistha, Paramesthin, Vivasvat, Soma, Kardama, Krodha, Vikṛita.

The singular noun (an unusual case, compare Speyer, *S. Syn-tax*, § 294) occurs with *triṅcat* in xiii. 101. 15, *narakam triṅcatam prāpya* (v. l. in C.). The plural decade also is found in the later epic, e. g. *triṅcato 'bdān*, xiii. 103. 34.

The word *viṅcati* gives the name *Viviṅcati*, a hero whose foregone fate is to be attacked with twenty arrows, in a repeated phrase: *Viviṅcatim ca viṅcatyā viratham krtavān prabhuh*, vi. 117. 44=vii. 14. 27, etc. Such number-names are not confined to this hero and the three wise men, *Ekata*, *Dvita*, *Trita*, as they are found also in the satyrs' names, *Aṣṭaka* and *Navaka*, *Skanda's* goat-faced sons, iii. 228. 12; and in xiv. 4. 5 are mentioned *Ikṣvāku's* descendants *Viṅca* and *Viviṅca*, who are unknown to the early epic but appear in the Purāṇic literature and the pseudo-epic so clearly associated with it.

An ordinal may be employed to take the place of a cardinal prefixed to another cardinal, as in i. 95. 37, *caturviṅcam putraçatam babhūva*, "a twenty-fourth son-century was born," that is one hundred plus twenty-four, which leads eventually to *caturviṅca* being used for *caturviṅcati* as in *caturviṅçākṣarā* for the *Gāyatri* in the *Harivaṅça* (v. PW.), a meaning that may belong to the passage above as well.

The ordinal may (but does not generally) agree with distributed singulars, although combined with one, as in the verse of ii. 77. 31 repeated at xiii. 148. 61, *Duryodhanasya Kārṇasya Çakuneç ca . . . Duḥçāsanacaturthānām bhūmiḥ pāsyati çñitam*. The ordinal in such a phrase as "five went and she too (as) sixth" needs no comment, and almost as common is such a turn as "they five set out having her (as) sixth;" but "with self as" is probably a late locution, though like the Greek idiom. It is found in (xii. 177. 52, *ātmanā saptamam kāmam hatvā*) the same passage from which examples of these constructions may be taken, namely, "seventh with himself (instrumental) went the king," xvii. 1. 23-25, *prasthitān Drāupadiṣaṣṭhān . . . bhrātaraḥ pañca Kṛṣṇa ca ṣaṣṭhī çvā cāi 'va saptamaḥ*, followed by *ātmanā saptamo rājā nirayāu Gajasāhvayāt* (late addition to Pāṇini, vi. 3. 6, PW. Rām. examples). As *ātman*, plural reflexive in singular, is not very fully illustrated in PW., I will add *nāthavantam ivā 'tmānam menire*, "they regarded themselves as having a savior," i. 183. 10.

The word *dvitīya*, “second,” passes in compounds from the meaning “having as second” to that of “with,” and independently to that of alter (ego), i. e., a friend. Familiar examples are those given by Speyer, *chāyādvitīya*, “(doubled) with his shadow,” *asidvītiya* “seconded by his sword.” An example of the personal construction is *Yuyudhānadvītiya*, “along with Y.,” xiv. 66. 11<sup>1</sup> (compare *dvitīyavat*, with instrumental, iii. 313. 47); *me dvitīyah*, “my friend,” xiii. 102. 57. The idiom, though perhaps not new, is not often used,—generally in late passages. Another case occurs in v. 50. 26, *Kṛṣṇadvitīyah*, a passage not removed from the suspicion of being a late adornment.

The second ordinal answers to our “another” in such phrases as *dvitīyasāgaranibha*, “like another ocean;” while the “same” is expressed by the first cardinal: *ekaduḥkhāḥ prthaksukhāḥ*, “having the same sorrows but separate pleasures,” i. 10. 4 and 50; *ekārtha, ekabhojana*, “having the same aim, food,” etc.<sup>2</sup>

Ordinals are occasionally used to indicate time. First in time, as contrasted with a subsequent event, is, indeed, generally given by *pūrva*, “former,” *pūrvarūpāṇi*, “preliminary symptoms,” xii. 228. 1; or *purastāt*, “previously,” i. 189. 22; but *prathama* is used in the same way, *prathamam . . . paścāt*, “at first and afterwards,” xii. 227. 68, etc. A “second time” is *dvitīyam*, iii. 60. 7; *dviḥ pūrvam idaṁ tṛtīyam*, “twice before and now for the third time,” iii. 92. 9; *pūrvam . . . punaḥ . . . idaṁ tṛtīyam*, “first, then again, and now for the third time,” xviii. 3. 35; often as adj., *eṣā tṛtīyā jññāsā tava kṛtā*, “this is the third examination you have taken,” ib. 32.

Before passing on to the epic methods of indicating arithmetical processes in detail, I may remark that with the exception of time (and religious observances),<sup>3</sup> where the duodecimal sys-

<sup>1</sup> The next stanza, xiv. 66. 12, has a form not recognized in the lexicon, *pīṭṣvasām*, as compared with the regular *pīṭṣvasāram*, the latter found in v. 90. 1; viii. 87. 16; xiv. 52. 53. Another late passage, vi. 116. 3, has *svasām* (like *duhitām* in Virāṭa; the last noticed by Holtzmann, *Anhang*, § 371).

<sup>2</sup> Occasionally ambiguous. Thus, *ekapatnītā* is the condition of having “the same wife”; but in R. v. 28. 13, *ekapatnītvam* is having “only one wife.” But the context makes the meaning clear.

<sup>3</sup> The expansion is rather wide on this side and varies between time-divisions (twelve years of fasting, sacrificing, etc.) and religious numbers, for example, the twelve syllables of the *pāda* of the *jagatī* verse, iii. 134. 19 (observe *navākṣarā bṛhatī*, ib. 16).



tem, 12, (30) 60, etc., is naturally selected, the decimal system is in ordinary use, both for the system of administration, xii. 87. 1 ff., and for the army, ib. 100. 31, etc. But it does not appear in any system of measures and only once is used of weights, though it should be added that the indications of values are so rare as to be of little importance (in iii. 134. 15, *aṣṭāu ṣaṇāḥ ṣatamānaṁ vahanti*; also *drauṇika*, ref. PW.).

### COUNTING AND ADDITION.

Except in counting up money, *sampīdayati*, and a poetical use of *yuj* and *yoga* (*navāi 'va yogo gaṇanāme 'ti ṣaṣvat*, of the nine digits in counting, iii. 134. 16; *tam muhūrtaṁ kṣaṇaṁ velāṁ divasaṁ ca yuyoja ha*, "she reckoned the time," ib. 296. 7), the usual word for count (counting is *gaṇanā*) is (*pra*)<sup>1</sup> *gaṇayati*, as in iii. 193. 28, *yatrā 'hāni na gaṇyante*, "where days are not counted;" *saṁgaṇanā nā 'sti*, "there's no counting," xiv. 73. 24; *gaṇayasva*, "count," iii. 72. 23; a word that passes into the sense of reckon, think, especially with *vi*, and regard, *na ca tān gaṇayām āsuḥ*, "disregarded them," viii. 37. 10 (*gaṇaye* in R. vii. 16. 42 appears as *gaṇe*, *mānuṣān na gaṇe*, "I don't regard men"). Often follows the object compared in the instrumental, *na gaṇayāmy etāṁs tṛṇenā 'pi*, "I do not care a straw for them," ii. 44. 34. Though *gaṇeya* is used, yet the corresponding adjective, calculable, is usually *parimeya* or *saṁkhyeya*, *saṁkhyā*, i. 74. 33; iii. 121. 11, etc.; i. 55. 2, *ṣak-rasya yajñāḥ ṣatasamkhyā uktaḥ*; xiii. 107. 36, *saṁkhyā atigunā*, "incalculable number." The idea of addition is given both by simple juxtaposition, usually prefixing, of cardinal or even ordinal (above) numbers, whereby it is sometimes doubtful whether, as in *daṣaṣatam*, the modification is by addition or by multiplication; and by *adhikam*, as in *ekā ṣatādhikā* (i. 115. 21 and 41, *ekādhikaṣatam pūrṇam*, *ṣatam pañcādhikam*, or prefixed); that of completeness, by *pūrṇa*, full, *sāgra*, all, and *api* and *pari*. Only the last requires a word.<sup>2</sup> The native scho-

<sup>1</sup> *tataḥ pragaṇayām āsuḥ kasya vāro 'dya*, "they calculated whose turn it was," i. 164. 14.

<sup>2</sup> For *pūrṇa*: "they say that ten hundreds are a full, *pūrṇa*, thousand," iii. 134. 17. For *sāgra*: *ṣatam sāgram*, "a whole hundred," xii. 112. 6; R. G. v. 7. 28; for *api*: "still be to thee even (full) ninety-nine sons, but abandon this one," *ṣatam ekonam apy astu putrāṇām, tyajāi 'nam ekam*, i. 115. 37.

liast gives to *pari* not the sense of completeness but of addition. Unfortunately he does not recognize the reading *parivīṇṇat*, given above, but he renders *paricaturdaṣa* by fifteen at iii. 1. 11 and iii. 93. 28, and at ii. 3. 37 by “fourteen over” (more). On *pariṣodaṣa*, at iii. 78. 2, he says nothing. Completeness would seem to be the real meaning by analogy with *parisaṁvatsara*, for example in iii. 108. 13 ff., *sahasraparivatsarān . . . saṁvatsarasahasre tu gate divye*.

Less common is the use of *uttara*. In i. 128. 18, *ṣaṭam ekot-taraṁ teṣāṁ*, “a hundred of them with one more.” So in iii. 308. 1, *daṣottara* in the phrase *ḡukle daṣottare pakṣe*, “on the eleventh bright half-month” (after ten full months). This accords not only with the scholiast’s explanation but also with the usual allotment of ten (whole) months of pregnancy. Other examples of *uttara* as plus will be found correctly given in the Petersburg lexicon. Colloquial is *kim uttaram*, “what more?”; “not to have *uttaram*” is to be unable to reply to a remark. Another word for “more” is *ūrdhvam*, over, beyond, with ablative. An adjective with *paras* or *param* also does duty for “more”: *pādarakṣān paraḥṣatān* “beyond a hundred guards,” vi. 95. 36; *paraṁsahasrā viprāḥ*, “over a thousand priests,” xii. 38. 24; as *para* itself is used, *ekaṣ cā ’pi ṣatāt paraḥ*, “one more than a hundred,” i. 115. 1; *saṁvatsaraparāḥ kṣapāḥ*, “more than a year (of) nights,” i. 221. 13 (viii. 90. 61; 78. 55, *paraḥṣata* and *paraṁṣata* have already been cited by Professor Holtzmann, *Zur Geschichte*, i. p. 161. Examples are not numerous). Nīlakaṇṭha follows an improbable tradition in attributing the meaning of “more” to *nīs* in *nīstrīṇṣa*, (a sword) “more than thirty” thumbs in length, *trīṇṣadaṅgulā-dhikāḥ*, iv. 42. 16, and elsewhere.

The word, *adhika* or *abhyadhika*, is used to convey a comparative notion, “more than,” *dīrghebhyaḥ ca manusyebhyaḥ pramāṇād adhiko bhūvi*, “greater in size even than tall men,” xiii. 160. 15; which leads to the sense “superior to,” *lāghave sāuṣṭaveṣu sarveṣāṁ abhyadhikāḥ*, i. 132. 15, and even to that of “more happy.” The ablative usually follows. Examples :

viii. 35. 4, *īṣvarād adhikāḥ*, (Brahman) “greater than Īṣva.”

vii. 74. 25, *yogāt tvatto ’dhiko ’rjunāḥ*, “superior to you through practice.”

viii. 32. 61, *Karṇo hy abhyadhikāḥ Pārthāt*, the same.

viii. 83. 31, *abhyadhiko rasaḥ*, "a better taste."

iii. 92. 15, *ko nāmā 'bhyadhikas tataḥ*, "more blessed (superior, better off) than he."

So (*abhy*) *adhikam* is used as the comparative-maker of adjectives: *Soma Rohiṇyām abhyadhikam pritimān bhūtaḥ*, "Soma was more in love with Rohiṇī," xii. 343. 57; *sā 'dhikam śobhamānā*, "she was more lovely," i. 221. 20. But *adhika* may mean "too great," as in the only defect of Arjuna: *piṇḍike 'syā 'dhike*, xiv. 87. 8 (his cheekbones were too prominent).<sup>1</sup>

### SUBTRACTION.

The farmer's crop which is *śaḍbhāgapariṣuddha* is "cleared" of the royal tax, that is, the sixth part of it has been subtracted, xiii. 112. 19. The usual term to indicate that one number has been subtracted from another is *ūna*, lacking, deficient, *pañco-nan śatam*, "a hundred less five," iii. 72. 11. The independent use of this word is rare: *ūne dviyojane gatvā*, "two incomplete leagues" (not quite two), ix. 5. 50. Nilakaṇṭha recognizes the meaning of *nyūna*, the usual word for almost, in *avara*, which occurs in ii. 15. 22, *evam sarvān vaṣe cakre Jarāsandhaḥ śatā-varān*, "he has overcome almost all a hundred," after it has been said that the kings overcome were a hundred and one, and just before the more precise statement that they numbered eighty-six and that fourteen remained, *śeṣā rājaṇṣ caturdaśa*, çl. 18 and 25, to complete the tale of one hundred. As one and a hundred means only a large number, *nyūna*, "not quite," is supported by the context as the probable meaning of *avara*, and another passage also seems to show that this meaning, not recognized in the lexicon, which gives only "at least" with numbers, is possible. This is *na kaṣ cid aharat tatra sahasrāvaram arhaṇam*, "no one brought as tribute there less than a thousand," ii. 35. 11, literally "a tribute having a diminished thousand," so that *avara*, "less," forms the counterpart to *uttara*, "more." The other meaning, from the idea of "less," that of "at least," is, however, the usual one, as in *mantriṇaḥ trya-*

<sup>1</sup> For "a half more than all" we have "all and more by" in xiii. 125. 10 (extension of Manu iv. 85); *ardhenāi 'tāni sarvāni nṛpatiḥ kathyate 'dhikaḥ*. The scholiast says *adhikaḥ* is in antithesis to a little, *kṣudra*, king (equal to all these by a half is a great king).

*varāḥ*, “at least three,” xii. 83. 47. The “deficient” idea is common enough with nouns, for example, *guṇāvara*, “deficient in qualities,” and glides naturally into the combination with numbers. Another example of the rarer sense may, I think, be found in xii. 321. 158: *sa (rājā) tusyed daṣabhāgena tatas tv anyo daṣavarāḥ*, where “at least ten” scarcely makes the required antithesis of not even ten; for the sense seems to be that a very energetic warlike king “should be satisfied with a tenth and any other with still less.”<sup>1</sup> Opposed, by the way, to *avara* in the usual sense is *parama*. As shown above, *para* means “more;” but *parama* means “at most,” *sahasraparama*, “at most a thousand,” and this “most” is used for “whole,” *trivarsaparamoṣita*, of seeds kept to the highest point of three years, or, as we should say, three whole years, xiv. 91. 16.

The “remainder” is *ceṣam* or *ṣiṣṭam*, as in *pañcāṣatāṁ śat ca ceṣaṁ dīnānāṁ tava jīvitasya*, “the remainder of thy life is fifty-six days,” xii. 51. 14; *ṣiṣṭam alpaṁ naḥ*, “our life’s remnant is short;” *ceṣeṣv anyeṣu kāleṣu* “at other times, on remaining occasions,” i. 122. 26; *ceṣe*, “as for the rest,” *aṣeṣataḥ*, “wholly” (without remainder). The participle is more common than the noun, *varṣāṇi trīṇi ṣiṣṭāni*, “three years remain,” xv. 20. 32, and so often, especially with other participles, *hata-ṣiṣṭāḥ*, “those left from the killed,” still alive, xii. 54. 5, etc. The verb commonly used is *hiyate*, “is less” (*avaṣiṣyate*, “remains,” *avaṣiṣṭam*=*ṣiṣṭam*), opposed to *atiricyate* “is more;” *samībhavati*, “is equal” (equal in size is generally *samīmitam*); for “equal” as quit, the same word, *ubhayaṁ tat samībhūtam*, “both sides are quit,” xii. 139. 24; equal, of scales, *tulā me sarvabhūteṣu samā tiṣṭhati* (*samo* ‘*haṁ sarvabhūteṣu*’), xii. 263. 10. Compare xii. 176. 10:

*ākimcanyam ca rājyam ca tulayā samatolayam  
atyaricyata dāridryam rājyād api guṇādhikam,*

“I weighed in the scale poverty and kingship; poverty having more good qualities surpassed even kingship.” The measure is given by *pramāṇa*, either of size (as usual) or of number, as in

---

<sup>1</sup> Just before, the *daṣavarga* is the group of imperial factors, but this does not seem to be referred to in this verse. The king, *sa*, is expressly *mahotsāha* and fond of military duties.

xiii. 107. 32, *lomnām pramāṇeṇa samam*, sc. *ṛksacarmaçatasya*, (he is exalted in the Brahman world) "equally (as to years) with the number of hairs" (of a hundred bearskins). "Less" as inferior, secondary, is *gāuṇa* (see the next paragraph).

#### MULTIPLICATION.

While the word for times in its literal sense is (*-varam*) *kṛtvaḥ*, *pañcakṛtvas tvayo 'ktaḥ*, i. 197. 49; *triḥsaptakṛtvaḥ*, passim, the verb for times, multiply, is *guṇay*, whence *guṇita*, multiplied by (the number preceding), literally "qualified." In later texts, *guṇikṛta* is used in just the same way, but in the epic this word is, I think, used only in *dviguṇikṛtavikramaḥ* (*Great Epic*, p. 419). In the same way, *guṇibhūta* is used in later texts for *guṇita*, multiplied, but in the epic it means inferior (compare *gāuṇa*), *guṇibhūtā guṇāḥ sarve tiṣṭhanti hi parākrame*, "all qualities are qualified in (inferior to) valor," ii. 16. 11. But usually no verb is needed to express multiplication, which as a formal arithmetical process the epic has as little occasion to make use of as subtraction. But the informal multiplication of ordinary language, double, thrice, a hundred-fold, without formal sums, is as common as in any other language, and the times thus indicated is regularly expressed either by simple juxtaposition of numbers, whereby, as has already been said, one is uncertain whether addition or multiplication is intended, as in *pañcaçatam*, one hundred and five or five hundred, iv. 43. 6 (only the syntax sometimes shows decidedly, *narāṇām pañcapañcāçad eṣā pattir vidhīyate*, "a *patti* is reckoned as five [and] fifty men," v. 155. 28); or by the noun *guṇa*, as in *ṣaṭçirā dviguṇaçrotraḥ*, "having six heads and double as many ears," iii. 225. 17; *ekāikaṁ triguṇāḥ çarāḥ*, "each one (he wounded) with three times the number of arrows" (each had used), viii. 48. 70; *tataḥ ṣaṣṭiguṇe kāle*, "in a time sixty times longer than that," xiii. 28. 10. In this last case the same idea is expressed in the following stanzas without *guṇa*, but perhaps only because this word has been used several times already. Thus in 11, *tatas tu dvigaṇe kāle labhate kāṇḍapṛṣṭhatām*, "in a time two hundred (times longer) than that." As an adverb: *tataḥ çataguṇaṁ duḥkham idam mām aspr̥çad bhṛçam*, "this grief has afflicted me sorely, a hundred times worse than that,"

xi. 27. 33. In this use *guṇa* has ousted almost completely the old *vṛt* of *trivṛt*, which survives only in a few hereditary turns. A very uncommon equivalent is *saṅkhyā*, as in xv. 3. 63, *yasya nāgasahasreṇa śatasāṅkhyeṇa vāi balam*, “whose strength is comparable with a thousand elephants’ a hundred times over” (numbered a hundred). Between the qualitative and temporal meaning, where the word is equivalent to *kṛtvāḥ*, “times,” lies the application found in ii. 24. 6, where, in a wrestling-match, one is whirled about a hundred times, *śataguṇam*, a description, by the way, copied in many details by the writer of iv. 13, where ḡl. 36, for example, has the same expression. Here *dviguṇam* occurs in a physical sense also, *rakṣo dviguṇam cakre*, “he doubled that demon up,” i. 163. 27 and elsewhere.

A combination of adding and multiplying, as in “more than so many times that” is expressed by the *guṇated* numeral (to use this word thus) plus the word for “more.” Thus, “he gave them wealth more than five times what they had asked him for” is *prāḍāc ca draviṇam . . . yatho ’ktavantas te tasmiṅś tataḥ pañcaguṇādhikam*, ii. 12. 15. Without “more”: *yatho ’padīṣṭam ācāryāiḥ kāryaḥ pañcaguṇo rathaḥ*, “let my chariot be furnished with five times (as many arrows) as the teachers enjoin,” vii. 112. 48; *yathā veda dviguṇam vetsyi*, “you know twice as much as he knows,” viii. 32. 62. Here partial correlation takes the place of the comparative (ablative) idea. The more elaborate construction is also common, as in xiii. 100. 7: *yathā ca grhīṇas toṣaḥ . . . tathā śataguṇā prītir devatānām*, “a hundredfold so great is the joy of the divinities as is the satisfaction of the householder.”

Sometimes, when the completion of the clause is easily understood, it is left out entirely, and we find (of the *ahīna* sacrifice) *dakṣiṇām triguṇām kuru, tritvaṁ vrajatu*, “make the fee threefold, let it reach treble,” xiv. 88. 14, that is, make it three times more (than ordinary).

Some curiously awkward methods of multiplying are found. In i. 55. 2, after saying that Indra’s sacrifices are a hundred in

---

<sup>1</sup> So in using the ablative it is not necessary, any more than in Greek, to be precise in the application of the case following “times that;” *açvamedhād daçaguṇam phalam āhuḥ*, “they say the fruit is ten-fold (that of) a horse-sacrifice,” iii. 82. 27.

number, *saṁkhyā*, the poet adds: "But your sacrifice here, O Bhārata, is *tathā param tulyasaṁkhyam gatam vāi*," which the scholiast explains as equal to an *ayuta* of Çakra's (100×100), but perhaps only another hundred is intended. In xiv. 65. 18, however, there is no escaping the awkwardness with which one number is multiplied into another of a separate category. What the poet wants to say is sixty thousand camels and twice as many hundred horses, which he expresses by "twice as many horses hundreds," *ṣaṣtir ustrasahasrāṇi śatāni dviguṇā hayāḥ*. This is followed by *tāvad eva* with the plural noun, *śakatāni rathāḥ cāi 'va tāvad eva kareṇavaḥ*, that is, "just as much" instead of "as many." So in iii. 281. 10-12, "fourteen crores of Piçācas, twice as much of Rakṣasas, *dvistāvat* (with genitive and with *koṭyaḥ* supplied), and three times as many Yakṣas," *tataḥ triguṇā yakṣāḥ*. Similarly, *yāvat tasya bhavet puṣṭis tejo* (etc.), *Kṛṣṇe tattriguṇam*, "however much may be Arjuna's prosperity, glory, etc., Kṛṣṇa's is three times that," xiii. 148. 34. Ordinarily the numeral adjectives agree with the nouns compared, as in iii. 122. 27, *yāvantaḥ pāvakāḥ proktāḥ somās tāvanta eva tu*; vii. 201, 59, *ṣaṣṭim varṣasahasrāṇi tāvanty eva śatāni ca*. A connecting link is furnished by *tāvat* as part of a compound *yāvanti tasyā romāṇi tāvadyugasahasrāṇi*, iii. 200. 71, etc.

Another case of comparing numerically different sorts of things is found in vii. 65. 9, but here the number is the same: *vārṁśāḥ ca yūpā yāvantaḥ . . . te tathāi 'va punaḥ cā 'nye tāvantaḥ kāñcanā 'bhavan*.

Distribution is expressed by repetition, with or without an adverb: *navame navame 'hanī . . . daṣāhe vāi gate gate*, "each ninth day . . . as often as the tenth day passed," xiii. 107. 39, 43; *trayāṇām mithunam sarvam ekāikasya prthak prthak*, "each one separately has two of the three," xiv. 18. 27. This relieves one of the necessity of distinguishing between each and all; for example, in xiv. 90. 34, *kuḍavaṁ kuḍavaṁ sarve vya-bhajanta*, "they all divided (so that each obtained) one kuḍava;" iii. 124. 21, *catasraḥ cā 'yatā daṁstrā yojanānām śatam gatam*, "four fangs extending a hundred leagues each." But *ekāika* is usually expressed, as above and in ii. 52. 21, *dat-tvāi 'kāiko daṣaśatān kuñjarān*, "each giving ten hundred elephants." The noun used alone may be singular, *jātam jātam*

*ca sū putraṁ kṣipaty ambhasi*, "she throws in the water (each) son when born," or plural, *jātān jātān prakṣipā 'smān (putrān)*, i. 98. 13 and 99. 43. The verb may agree with the singular: *ekāikas te tadā pāṣāḥ kramaṣaḥ parimokṣyate*, xii. 227. 116, perhaps only metrical, as in the same chapter *ṣocimī* for *ṣocāmi*, ḡl. 88. The late derivative *ekāikaṣyena* is found in xii. 326. 38, *tad antahpurakānanam suramyān darṣayām āsur ekāikaṣyena* (here the grove opens out from the third *kakṣyā* of the palace).

With adjectives the cardinal stem prefixed multiplies the adjective, *caturbhadrataras¹ tvayā*, "four times as happy (compared) with you," in vii. 55. 49. and xii. 29. 30, two scenes where all the "kings that died" are spoken of at length in two different but related accounts, of some value for the history of the epic.² In vii. 70. 25, the phrase is intensified: *caturbhadratarās tvayā bhadraṣatādḥikāḥ*.

Finally, there is the multiplication expressed by *dhā* as an ending, which gives not only the times of division and consequent multiplication of parts, and time literally, *ekadhā*, "at one time," but also the multiple times in numbers, *saptadhā*, "seven times (over)." *Sapta trīdhā* is thus equivalent to *sapta triḡuṇāni*. In xii. 223. 22, the Gandharvas dance *ṣaṭ sahasrāṇi*

¹ The instrumental is not so very rare. Compare *eko hi bahubhiḥ greyān*, "one (sage) better than many" (fools), iii. 99. 22; *ko nu svantataro mayā*, ix. 64. 21; *sā 'cā kṛṣṭatārī mayā*, xii. 128. 14; *durmarṣanataras tvayā*, xii. 227. 81. The ablative is used after a positive, *mama balam bhīmaṁ vāyor api*, "my strength is greater than the wind," xii. 155. 6. One case expresses comparison, the other the distance from, *sukhāt sukhātaram prāptaḥ*, "coming from joy to more joy," xiii. 119. 11. The ablative is found with only an implied comparison, *rājyād devatvam icchanti*, "they wish godship from kingship," xii. 180. 20, leading to preference (*vr̥ṇe* and *abl.*; also *greyān dāho na bhakṣaṇam*, i. 230. 21, etc.; Holtzmann, § 292 b). Noticeable is the double ablative showing clearly the construction's origin, *svavīryād rājavīryāc ca sva, vīryam balavattaram*, "from (of) his own and a king's, his own power is stronger," xii. 165. 18. Holtzmann, at § 281, gives a few more examples of the instrumental. To the gen. comparat., my *Great Epic*, p. 473, add *maraṇaṁ cōbhanam (=varam) tasya*, i. 79. 13.

² The introduction of the former is in the latter put at the end of the account and the latter omits the second Rāma, which completes the list of sixteen in Droṇa. Bharata, too, changes places, being the antepenultimate king in Çānti but the fifth in Droṇa, which has several later features.



*saptadhā*, literally in seven groups of six thousands, or seven times six thousand, that is, a not unusual amplification by a sacred multiple of an old group, for the Atharva Veda, xi. 5. 2, gives the same conventional *ṣaṭsahasrāḥ*, though here three hundred thirty-three are added. The epic itself gives to the Gandharvas another conventional number at iii. 139. 6, where they are eighty-eight thousand in number and the Yakṣas are four times as many, *aṣṭācītisahasrāṇi Gandharvāḥ . . . Yakṣāc cāi 'vā caturguṇāḥ*. Another example is furnished by the list of Munis in seven groups of seven each, at xiii. 151. 42: *ity ete munayo divyā ekāikaḥ sapta saptadhā*, etc., "seven, one by one, reckoned sevenfold" (a different account in xiii. 166. 37 ff.). Compare also *saptadhā sapta saptasu ; janma saptadhā*, xiv. 20. 23 and 27. The number of times a multiplied god appears is often expressed thus, as when Rudra, kind and terrible, one-eyed and three-eyed, appears as *ekadhā, dvīdhā, bahudhā, ṣatadhā, sahasradhā, ṣatasahasradhā*, xiii. 161. 43. One of his forms, by the way, is *dhūmra*, which gives, it is said, his name of *dhūrjati(n)*, a title found only here, xiii. 162. 9, and vii. 202. 129, two passages of the same period and content, a late epic "Çatarudriya."

#### DIVISION.

Halving is expressed by *dvāidhībhū* or *-kar* or *dvidhākar*; other divisions by *trīdhā* (*trāidham*), *caturdhā*, and so on, with *kar* or *vibhaj*, e. g., *daṣadhā kāryaṁ ṣeṣam*, "the remainder is to be divided tenfold;" *dvidhā kṛtā jīhvāḥ*, ("therefore the snakes') tongues were cloven," i. 34. 23 (*dvījīhvāḥ ca kṛtāḥ*, 24); *gavāṁ dvāidhīkṛtāḥ khurāḥ, khurān dvidhā 'karot*, "Rudra clove the hoofs of his bull and other cattle," viii. 34. 105. The half, *ardha*, is used no more with nouns than with participles: *ardhāsanam labdhavān*, "he got half of Indra's throne," iii. 126. 38; *ardhacyutāsanāḥ*, "half flung from their seat," vii. 196. 15; also of course with other numbers. With words of time, *ardha* follows or precedes in *māsā-rdha*, *ardhamāsa*, and means either the middle (of day or night, *ardhadivasa*, *-rātra*) or half: *ardharātrasamayē*, "at midnight" (so passim); *yady ardhadivasam yudhyate*, "if he fights half a day," vii. 190. 46 (*ardhadivasam gatvā*, "going half a day," R. vii. 46. 24).

Besides *ardhamāsa*, “a month and a half” may of course be expressed in full. Thus, where *mā* is used exactly as in *mā ciram*, in iv. 21. 17, *mā dīrgham ksama kālaṁ tvam māsam ardham ca sammatam*, “have patience for a short time, a month and a half” (= *sārdha*).

The use of *ardha* with other numbers shows that, as in the case of two numbers joined and indicating that the former influences the latter without specifying how (e. g. *daśaśata*=110 or 1000), the prefixed *ardha* modifies the word with which it is connected, but does not specify whether by addition or subtraction or multiplication. So *ardhaśatam* is one hundred modified by one half, just as *ekaśatam* is one hundred modified by one, and the hearer is left to determine whether this means half a hundred or one hundred plus a half (hundred). With other fractions, however, there is understood a conventional modification of subtraction. Thus “half-fourth” is always (as adjective) three and a half, that is four as modified by a half. For example, up to two and a half *koss* is “to the half-third *koss*,” i. e. to the third *koss* as modified by a half, *krośād ardhatṛtīyāt*.<sup>1</sup>

When not defined, *bhāga* and *aṅga*, “part,” mean a quarter, *caturbhāga*=*pāda*, a (fourth) part (of a quadruped). For three quarters is used either “three quarter parts” or “three parts.” The usual meaning of “three-part,” *tribhāga*, is one third, but it occurs also in the later epic (as in still later literature) in the meaning of three quarters. For other divisions, the part is made explicit, *aṣṭibhāga*,  $\frac{1}{8}$ , etc. Only *kalā* is almost always  $\frac{1}{16}$ .

iii. 190. 10, (*kṛte catuspād dharmah*) *adharmapādavidddhas tu tribhir aṅcāiḥ pratiṣṭhitaḥ*;

ib. 11 and 12, *tribhir aṅcāiḥ, caturthāṅgena*.

In the pseudo-epic, the same situation is expressed by *pādonno dharmah* (in Tretā), *dvipāda*, *pāda* (*adhare yuge*), to which is added the unique idea that even this quarter in Kali is so diminished as to leave one sixty-fourth, *bhavet kālavīṣeṣeṇa kalā dharmasya śoḍaśī*, xii. 268. 33–34 (*caturthāṅga* also xii. 283. 51).

<sup>1</sup> The passage is cited in full on p. 147, below. I fail to understand Speyer's explanation, *S. Syntax*, § 301, that *ardhatṛtīya* in such a case means “having the third being [but] half.”

ii. 68. 78, *ardham harati vāi gṛeṣṭhaḥ pādo bhavati kartṛṣu.*  
iv. 52. 17, *balacaturbhāga*, “one fourth the army.”

xii. 24. 12, *ādāya baḷiṣaḍbhāgaṁ yo rāṣṭraṁ nā 'bhīrakṣati*  
*pratigṛhṇāti tatpāpam caturāṁṣena bhūmipah.*

ii. 5. 70,

*kaccid āyasya cā 'rdhena caturbhāgena vā punaḥ*  
*pādabhāgāis tribhir vā 'pi vyayaḥ saṁcuddhyate tava,*  
“are your expenses covered by a half or a quarter, or  
at any rate by three quarters of your income?”

vii. 186. 1,

*tribhāgamātraṣṭāyāṁ rātryāṁ yuddham āvartata,*  
“the battle was renewed when one third the night was  
left.”

vii. 191. 9,

*tasya cā 'hnaṣ tribhāgena kṣayaṁ jagmuḥ patattriṇaḥ,*  
“in the course of one third of that day.”

The “third” may of course be expressed, as in xii. 285. 23,  
*labheta bhāgam . . . ardham tathā bhāgam atho tṛtīyam.* In xiii.  
168. 28, *tribhāgaṣṭa* means “having three quarters left.”

In i. 96. 21 (as *ardhārdha* still later means a fourth) one  
eighth is expressed by “half a fourth,” *turīyārdham pradās-*  
*yāmo vīryasyāi 'kāikaṣo vāyam*, “we shall severally give a half  
of the fourth of our power,” said by the eight Vasus. It is  
rather remarkable that Kṛṣṇa is described in xii. 281. 62 as this  
fraction of God: *mūlasthāyī mahādevaḥ . . . tatsthaḥ sṛjati tām*  
*bhāvān . . . turīyārdhena tasye 'maṁ viddhi Keçavam.*

When quarters are mentioned, as when Çrī is quartered,  
*caturdhā vibhaktā*, and the quarters are enumerated, the first is  
*pāda* alone, the others are *dvitīya*, *tṛtīya*, *caturtha*, *pādas*, xiii.  
225. 19 ff.

According to the commentator, *triḡuṇa*, threefold, like *tri-*  
*bhāga*, also means one third in v. 55. 66, where, after eleven  
armies have been contrasted with the seven which in comparison  
are called *nyūnāḥ*, “deficient,” the deficiency is declared to be  
great enough to warrant a battle, for

*balam triḡuṇato hīnam yodhyam prāha Brhaspatiḥ*  
*parebhyaṣ triḡuṇā ce 'yam mama rājann anīkinī,*

whereto N. remarks that the adverb means (deficient) by a  
third, *tryaṁṣena*, and the adjective “a third more.” And cer-

tainly if number is implied at all, eleven are not thrice seven but may be loosely reckoned as a group of three fours, deducting one of which would leave seven, so the “deficient” host would be “a third less” and the host of eleven would be “a third more” (measured by itself). There seems, however, to be a conscious play on words here, for in the next stanza the “deficiency,” *nyūnatā*, is explained as *guṇahīnam* or a moral lack.

In vituperation, which exercises the epic poets a good deal, it is customary to say that an opponent is not worth a half, a quarter, or a sixteenth of the other man. In praise, on the other hand, one says that the object of praise is worth one and a half of the other. One sixteenth, expressed either as “sixteenth particle” or simply a particle or a particle-part, denotes the smallest part usually taken into account. The word gives the last imperishable fraction of the moon visible before it disappears (xii. 305. 4, so the pure soul, *kalā sūkṣmā*, ib. 6 and 335. 40). The adjective full is sometimes added to the part. Twice this fraction is exceeded, once by saying that one eighteenth will not express the relation of inferiority, once by descending to one hundredth part to express contempt. Apart from vituperation, the “sixteenth particle” is employed in a few old phrases. It is found also in *Manu* and in Buddhist literature. Examples:

- i. 100. 68, *agnihotraṁ trayī vidyā santānam api cā 'kṣayam sarvāṇy etāny apatyasya kalām nā 'rhanti ṣoḍaśīm.*
- ii. 41. 27, *iṣṭaṁ dattam adhūtaṁ ca yajñāḥ ca bakudakṣiṇāḥ sarvam etad apatyasya kalām nā 'rhanti ṣoḍaśīm.*
- iii. 91. 23, *na sa Pārthasya saṁgrāme kalām arhati ṣoḍaśīm.*

So iii. 174. 3; 254. 27; 257. 4 (your sacrifice is inferior); vii. 36. 7 (the army); vii. 111. 30<sup>1</sup>. With *pūrṇa*: iv. 39. 14, *na cā 'rjunaḥ kalā pūrṇā<sup>2</sup> mama*, “Arjuna is not (as much as) one whole (sixteenth) part of me;” v. 49. 34, *nā 'yam kalā 'pi sam-pūrṇā Pāṇḍavānām*, “he is not even one whole (sixteenth) particle of the Pandus.” So in vii. 197. 17,

*yaḥ kalām ṣoḍaśīm pūrṇām Dhananījaya na te 'rhati.*

<sup>1</sup> In the next stanza, *nā 'lam Pārthasya saṁyuge* (rare genitive), “not equal to.”

<sup>2</sup> So I read (compare the next citation). PW. accepts the text, *kalā-pūrṇo*, s. v.

In viii. 15. 28 it is said, "all weapons are not worth a sixteenth part of him." As an equivalent of  $\frac{1}{16}$ , *prastha* ( $\frac{1}{16}$  of a measure) is used where it is appropriate, xiv. 90. 7, "this sacrifice is not equal to a *prastha* of grain of (given by) a man living by glean-ing corn," *saktuprasthena na tulyaḥ*.

In religious writing, besides the phrase above is found a (Buddhistic) comparison, repeated, xii. 174. 46; 177. 51; 277. 6:

*yac ca kāmasukhaṁ loke yac ca divyaṁ mahat sukhaṁ  
tṛṣṇākṣayasukhasyāi 'te nā 'rhataḥ śoḍaśīm kalām.*

This stanza is in fact attributed to the same Buddhistic king who sings of his happiness in having nothing, and it is associated with that famous stanza in the last two passages. In the same way is used *kalā* alone:

*aśvamedhasahasrasya vājapeyaśatasya ca  
yogasya kalayā tāta na tulyaṁ vidyate phalam,  
xii. 324. 9 (a Yoga improvement of Spruch 791).*

I have found the "sixteenth" phrase but once in a *triṣṭubh* stanza, with a slight alteration in form and sense (truth sur-passes all possessions):

iii. 34. 22, *rājyaṁ ca putrāḥ ca yaśo dhanam ca  
sarvaṁ na satyasya kalām upāiti.*

A curious account of the distribution of the world's wealth in vi. 6. 23 asserts that Kubera has one quarter of the valuables of Meru, out of which he dispenses one particle-part to mankind, equivalent to one sixty-fourth of all, as in the case of Kali's virtue (above):

*tasmāt kubero bhagavaṁś caturtham bhāgam aśnute  
tataḥ kalāṅgaṁ vīttasya manuṣyebhyaḥ prayacchati.*

Examples of other fractions in scorn: i. 201. 13, (*yuddhe*) *Rādheyasya na pādabhāk*, "not worth a quarter of him;" iii. 253. 9, *na cā 'pi pādabhāk Karṇaḥ Pāṇḍavānām (dhanurvede)*; vii. 76. 1, *teṣāṁ vīryam mamā 'rdhena na tulyam*, "their power is not equal to half of me;" xii. 155. 6, *kalām aṣṭādaśīm<sup>1</sup> prāñāir na me prāpnoti mārutaḥ*; x. 12. 17, *na samā mama vīryasya śatāṅgeṇā 'pi pīṇḍitāḥ*, "they all together are not equal to one hundredth part of my power."

<sup>1</sup> This  $\frac{1}{16}$  for the older  $\frac{1}{16}$  is a pseudo-epic alteration of the old phrase. It occurs in the Wind and Çālmali fable.

A back-handed boast of Karna, which, I think, the poet intentionally makes incoherent, is that of viii. 43. 9, *ṛte Çalya-sahasreṇa vijayeyam aham parān*, "I could conquer the enemy without (the help of) a thousand Çalyas," i. e., "I am equal to a thousand Çalyas," or rather "without Ç., a thousand times over." Çalya mockingly replies that Karna talks nonsense; whereupon Karna returns "more and double abuse," *paruṣaṁ dviguṇam bhūyaḥ*.

On the other hand, in lauding a friend, one and a half is the norm of comparison, as in the following examples:

vii. 72. 34, *mayā 'dhyardhaguṇaḥ (putraḥ)*, "my son is equal to me one and a half times over" (sometimes simply "equal to me").

xi. 20. 1, *adhyardhaguṇam āhur yam bale . . . pitrā tvayā ca*, "who in power they say is equal to one and a half times his father and you" (Kṛṣṇa!). But the comparison, too, is once used scornfully:

ix. 33. 19, *adhyardhena guṇene 'yaṁ gadā gurutarī mama na tathā Dhārtarāṣṭrasya*, "this club of mine is one and a half times heavier than that of D."

Apart from this belligerent use, one and a half is used of measurement of numbers, i. 1. 103, *adhyardhaçata*, "having one hundred and fifty;" of land, viii. 88. 10, *adhyardhamātre dhanuṣāṁ sahasre*, "on (land) measuring one and a half thousand bow-lengths;" v. 8. 2, *tasya senānivego 'bhūd adhyardham iva yojanam*, "his camp was about a league and a half."

In reckoning interest, *pādikam çatam* is twenty-five per cent., but the verse in which this occurs, ii. 5. 78, *pādikam ca catam vṛddhyā dadāsy ṛṇam anugraham*, has a varied reading, *praty ekam ca çatam* (metrical for *prati çatam ca ekam*).<sup>1</sup>

As observed above, the current words for fraction are *pāda*, *bhāga*, and *aṇṣa*. In xiii. 26. 97, appears in this sense *ekadeça*, a single part of a whole: *udāhṛtaḥ sarvathā te guṇānām mayāi 'kadeçaḥ . . . çaktir na me . . . guṇān sarvān parimāṭum*, "a single part of (Ganges') virtues I have told thee, I cannot count them all."

<sup>1</sup> The later epic, by the way, has two coins not previously recognized, besides the Roman denarius (implied), namely, the *kākiṇī* and *aṣṭāpa-dapada* (a gold *kārṣāpaṇa*), xii. 294. 16; 299. 40.

**DIMENSIONS, TERMS, VALUES, SYNTACTICAL CON-  
STRUCTION.**

The usual dimension, *parimāṇa*, mentioned in the epic is length, and with few exceptions distance (length) or height is the *pramāṇa*, a general word for size and extent. Certain measurements are made in the case of the few small things measured, but short distances are loosely cast in such forms as "near by," "not far," "within sight," or "within hearing," and indefinite smallness of extent in the same natural manner is described as "not an atom," "nor a bit," etc.

Distance: *teṣāṃ saṃgravaṇe*, "within hearing of them," xv. 18. 21 (ib. 20, *avidūrataḥ*, "not far off," like *saṃpataḥ*, "near," with genitive; also with ablative, *nā 'tidūreṇa naga-ram vanād asmād dhi lakṣaye*, i. 151. 44; *avidūre vanāt*, 152. 1; *na dūraṃ vanāt*, 154. 35; *abhyāṣe*, 156. 10, "in the neighborhood"); *āgramam prati*, *utsasarja garbham*, i. 8. 7, "near the asylum"; also *antikam* and *antike*, according to the verb. In the case of *sakāṣa*, "with(in) sight," proximity, the original sense in many cases has well-nigh disappeared, *mātuḥ sakāṣāt taṃ ṣāpam ṣrutvā*, "hearing of the curse on the part of his mother," i. 37. 1.

The Rāmāyaṇa has another, more modern, phrase to indicate proximity, namely *mūla*, as in *ahaṃ gamiṣyāmi Yamasya mūlam*, v. 28. 17; *mama mūlam*, ii. 64. 49, which belongs rather to Purāṇic than to epic diction.

Extent: *na tasyāḥ sūkṣmam api*, "no (superficial) atom of her," i. 211. 16; *na tasya kāye antaram*, "no space on his body," iii. 21. 7; *hayanāṃ nā 'ntaram*, "no interval between the horses," iii. 172. 6; *chidraṃ na rathayoḥ*, "no chink between the two chariots," i. 226. 3. Indeterminate size is given by compounds, much as in English, *gajā acalasaṃkāṣāḥ*, "mountain-size elephants," xv. 23. 9, etc.

The verb extend, *āyam*, is used of extending a circle, synonymous with *utsarj*, *maṇḍalam utsrjya*, v. 195. 15. The circumference is *pariṇāha*, the diameter, *viṣkambha*. To express the idea of equal distance from a center, the term usually employed is *samanta*, "on every side," in adverbial form, *vedī samantāt pañcayojanā*, "five leagues on every side," iii. 129. 22. Generally, the geometrical figures implied by battle-arrays, called *vyūhas*, are described in figurative language, as a bird, a

needle, a dolphin, and the troops are stationed on the beak, tail, and wings. Thus *karṇa*, ear, becomes “corner” in vi. 60. 10, *catuṣcaturvyālasahasrakarṇaḥ*, “(an array) with four thousand elephants on each corner” (N. *karṇeṣu vidigbhāgeṣu*). But there is a peculiarity here in that no figure has been mentioned, and according to the account this array should be like a former one of crescent shape with two horns, *gr̥ṇge*, but, not to speak of the plural, we cannot take this statement too literally, and I do not know that *karṇa* is even cornu.

A *gr̥ṇgātaka*, named from a triangular nut which has “horns,” is used to describe one of these *vyūhas* in vi. 87. 17, and may be a triangle, though here also the scholiast gives the usual epic meaning “shaped like a four-road place,” just as at iv. 68. 25, *catuspatha*, etc. A triangle is *trikoṇa*, *τρίγωνος*, (*triṅga*), of the *garuḍa*, late, as explained in my *Great Epic*, p. 372. A city square is a “four place,” *catvara*, xii. 69. 52, squares and markets being mentioned together in descriptions of cities. In xii. 73. 21, in antithesis to the whole, *kṛtsna*, city, this word may mean as in English a town-quarter; but in xii. 86. 8, *catvarāpanaṣobhita* is simply “beautified by squares and markets.” The “four” of a square is used also to give the idea of a four-square house, *catuṣcāla*, and *anta*, boundary, is also used to imply a square, as in *daṣakīṣkusahasrāntā*, of a hall, “ten thousand cubits square,” a meaning made clear by a parallel passage, where *samantāt*, “on all sides,” is expressly added, ii. 1. 21; 3. 23, and no circle can be intended. Earth, *catur-antā*, “has four boundaries,” that is, it is bounded by the “four seas.” In xiv. 64. 10, a camp is *ṣaṭpada* or *ṣaṭpatha* (and *navasamkhyāna* or *samsthāna*), with three streets running north and south and three east and west, according to the scholiast; but in xv. 5. 16 he explains *ṣaṭpadam puram* as having six (traversable) places within the seven walls (up to the inner city), which is not a likely meaning, since the word is followed by *sarvatodiṣam*, “in all directions.” Octagonal is *aṣṭā-grī* and other numerals are used with the same word, but only of edges, eight-edged posts and clubs.

Land is measured by bow-lengths (above), and by cow-hides, *api gocarmamātreṇa bhūmidānena pūyate*, “purified by giving even a cow-hide measure of land,” xiii. 62. 19; and the length of a cord is measured in the same way, *na tāṁ vadhrī pariṇahe*



*gatacarmā*, "a cord of a hundred hides could not encircle it," i. 30. 23. A "span of land" and "as much land as a needle's point could cover" are contemptuous terms.

From these general methods of measurement I turn to the more exact specifications found in the epic, arranging them on an ascending scale of comparison, from the "smallest finger" to the indefinite *yojana*, which is best rendered league, because its length varies like that of a league, while it approximates most closely to the three-mile league, though it ranges from that extent to about ten miles, according to later authorities; but nothing in the epic determines its length.

**Finger-measurement:** A thumb-joint serves as the measure of a small bit in general, *aṅguṣṭhaparvamātrā garbhāḥ*, i. 115. 20, and "thumbkin" spirits are perhaps conceived as being of thumb-size in relation to breadth as well as height. God himself, as a spirit, is measured by the size of a thumb-joint, *hṛdayaṁ sarvabhūtānāṁ parvaṇā 'ṅguṣṭhamātrakaḥ*, xii. 313. 15; as all spirits are described as *aṅguṣṭhamātra*, thumb-size.<sup>1</sup> All shortest measured distances are calculated by this norm, usually by twos and fours, the application showing, however, that "two thumbs" and "four thumbs" refer to thumb-breadths. Thus there is a stereotyped battle-phrase, *na tasyā 'śīd anir-bhinnaṁ gātre dvyaṅgulam antaram*, "there was not an unwounded space of two thumbs on his limb," vi. 119. 86; 175. 54; iv. 55. 5 (v. l.); xii. 77. 27. The same phrase is found in R. vi. 45. 20, with the verb of the Virāṭa passage but with only one "thumb": *na hy aviddhaṁ tayor gātre babhūvā 'ṅgulam antaram*, perhaps to be corrected as in Mbh. Earth is flung up "four thumbs," *caturaṅgulam*, by a chariot, viii. 90. 106. In a late scene, Yudhiṣṭhira's chariot floats four thumbs from the earth, *prthivyāḥ caturaṅgulam ucchritaḥ*, vii. 190. 56.

The "littlest finger" serves as a comparison in the description of xii. 127. 7-8 (Tanum):

*anyāir narāir mahābāho vapuṣā 'ṣṭagaṇānvitam . . .  
gaṛīram api rājendra tasya kāṇiṣṭhikāsamam,*

"eight times in shape compared with other men (i. e. eight times as tall),<sup>2</sup> the body being (slender) as the littlest finger";

<sup>1</sup> References in my *Great Epic*, p. 32.

<sup>2</sup> A man's height is often given by saying how many cubits he has (as below). For tall and short are used *prāñṇu* and *hrasva*, respectively,

where the poet has to change the regular form of the word *kan-isthikā* on account of the meter. I do not know whether in i. 52. 7, snakes that are the size of a *gokarṇa*, in antithesis to those that are leagues long, *gokarṇasya pramāṇataḥ*, *kroṣayojanamātrāḥ*, are imagined to be the length of a *gokarṇa*-arrow or of a thumb-and-finger-span, a late meaning of the word. When subsequently re-described, they are *yojanāyāmaṅvistarā* (also a Rāmāyaṇa phrase) *dviyojanasamāyatāḥ*, i. 57. 23, that is, measured by leagues only.

**Hand and span :** The triangular altar referred to above is described as “of eighteen hands,” *aṣṭādaśakarātmakāḥ*, xiv. 88. 32. The hand, however, is usually reckoned as a two-span cubit and not as a hand-length. Probably the “hand-tip” gives a double-span, for in the description of a slender woman it is said that her waist measures “a hand-tip,” *karāgrasammitam madhyam*, iv. 13. 22. So in xi. 18. 5, *anavadyāṅgī kara-sammitamadhyamā*, “of irreproachable form, measuring a ‘hand’ about the waist.” This measurement shows that the *kara* is equivalent to the *hasta*, a synonymous term, and equal to about a cubit (eighteen inches nominally, but perhaps only about sixteen), “eighteen inches round the waist” being (as I am informed) the boast of slender maids to-day, and Hindu women being petite. Double this length, two *hastas*, is given in Hindu tables as the circumference of a man’s body, about the average thirty-four to thirty-six-inch waist.

The span, *prādeśa*, is used of the measure of the breast about the spirit: *prādeśamātre hṛdi niḥsṛtaṁ yat*, “what is made manifest in the span-measured breast,” xii. 246. 28, that is, in the vital circle, measured as twelve thumbs in extent from the center; a late view if this reading be accepted.<sup>1</sup> Elsewhere the *prādeśa* is mentioned a few times in the epic, but never in such a way as to betray what is meant. It measures, for example, the difference in height between the Pāṇḍus and other men, and

---

*jaññe śāṅlagurūḥ prāñṣur mahimnā prathitāḥ prabhūḥ*, ix. 51. 34; the fever born of Īva’s sweat is a *hrasvo ‘timātram* (“excessively short”) devil, xii. 284. 40.

<sup>1</sup> Reading *prādeśamātram* we should have a reflex of Chāṇḍ. v. 18. 1; Māitri, vi. 38. The Āditya Purāṇa, cited by Colebrooke, *Essays*, vol. i. p. 539, says that Vyāsa makes the *prādeśa* only one thumb-breadth, and not ten or twelve, as taught by others.

between Bhīṣma and Arjuna, for “Bhīṣma in size was more by a span than Arjuna,” *pramāṇato Bhīṣmasenaḥ prādeḣeṇā ’dhiko ’rjunāt*, v. 51. 19, and (the same expression except for the instrumental case) in v. 169. 8, the Paṇḍus are a span taller than all others, *prādeḣeṇā ’dhikāḥ pumbhir anyāis te ca pramā-nataḥ*.

Another word for span is *vitasti*, whence the arrows “called span-long,” *vāitastikā nāma*, used only by special warriors at short distances in the descriptions of the late seventh book and nowhere else till they are met with again in the Harivaṅṣa and in the later Rāmāyaṇa. Thus in vii. 191. 42 and in R. vi. 49. 49 of the Gorresio edition, but not in the Bombay text. This is one of the many little indications that show how close Droṇa stands to the latest additions made to the epic. On the other hand, it helps to a terminus ad quem to find that *hasta* is never used for a measure in the epic, though common in the Purāṇas, and reckoned as two *vitastis* or twenty-four thumb-breadths.

**Cubits:** The cubits mentioned are *kiṣku*, in vii. 134. 10, “a club of four cubits,” and *aratni*, in i. 167. 25, “a bow (of Droṇa) of six cubits” (*catuṣkiṣku* and *ṣaḍaratnīdhanuḥ*, respectively, as possessive and determinative compounds). Post-epical authorities (cited by Colebrooke) make the *aratni* equal to twenty-one thumb-breadths, and two *aratnis* are one *kiṣku*; though some reckon a *kiṣku* as equal to four cubits. In vii. 175. 19, both these names, as if synonymous, are united in the description of a demon’s bow, “a twelve-cubit-bow a cubit round,” *vyaktam kiṣkuparīṇāhaṁ dvādaṣāratnikārmukam*. Arjuna’s bow, i. 189. 20; v. 160. 108, is as long as himself, *tāla-mātra*, “palm-tree tall,” a common though indefinite measure, which according to i. 197. 39 is the height of all the Paṇḍus. The five-cubit (*kiṣku*) bow of x. 18. 6 is allegorical but may indicate the usual length. Arrows are “axle-long,” *akṣamātra*, passim, and the *aṅjalika* arrow mentioned in viii. 91. 41 is three cubits, *tryaratni*. A later form, *ratni*, is used in this same book. Here, viii. 72. 30, it is said that Karna was *aṣṭaratnīḥ*, “eight cubits” tall (in iii. 126. 32 a man “grew thirteen cubits,” *avar-dhata kiṣkūn trayodaṣa*, but he was Māṁdhātara, and enjoyed peculiar nursing). We might almost suppose that this so-called cubit, whether *kiṣku* or *aratni*, was really a foot, or about twelve inches instead of eighteen. For the actual length of

Hindu bows and arrows are for the ordinary bow five feet and for the ordinary arrow two and a half to three feet (*Ruling Caste*, pp. 270, 276), and both five and six "cubits" are the size of the epic bows, while the one arrow measured is given as three cubits, the heroes being a little above but not much over the normal height and only Karna being of eight *ratnis*. Even he is not extolled as a giant, as a man of eight cubits would be. "Palm-tree tall" and another phrase used of the heroes, *çāla-stambhā ivo 'dgatāḥ*, "lofty as Çāl trees," v. 169. 7, are more grandiose than exact. As the later schemes reckon the cubits in thumbs (or fingers), the twenty-one and twenty-four thumbs that go, respectively, to an *aratni* and *hasta* must be estimated by the size of a Hindu hand, which at present is rather small. Further, the relation between thumb-joints and span, reckoned as from the end of the thumb to the outstretched fore-finger, is given as twelve, which is too many, for the distance corresponds rather to the relation between the span and the finger-breadth. Reckoned as eight inches, a normal span, the later cubit would be nearer sixteen than eighteen inches and the *ratni*, being still shorter, would not be much over a foot. According to the *Suçruta*, a man's height is one hundred and twenty thumbs, i. 126. 11, or ten spans, which at nine inches to a span would make the average Hindu seven and a half feet tall and at seven inches would still make him nearly six feet.

**Foot and Pace:** The measure by foot-pace is almost confined to a conventional "eight paces," *padāni*, often used in battle-scenes, but always, if I am not mistaken, in the same way, *āplutya*, or *abhyetya*, *padāny aṣṭāu*, as in vii. 15. 28; ix. 12. 20. Even a deer "went eight paces and then turned," *tataḥ sa harino gatvā padāny aṣṭāu nyavartata*, xii. 273. 14. According to the *Mārkaṇḍeya Purāṇa*, cited by Colebrook, *Essays*, vol. i., p. 539, a *pada* is a foot-breadth and not a pace, being only half a *vitasti* span or six fingers (thumbs). In the epic, as in "seven paces" in the marriage-rite, and in the colloquial phrase *pade pade*, "step by step," the word means a general pace-length or step. "Not a step" is almost equivalent to the French *ne pas*; for example, *nā 'kampata padāt padam*, "he did not budge a step" (at all), a common phrase, as in ix. 57. 46. The later epic has *padakam padakām çanāiḥ*, "step by step, slowly," xiii. 53. 35, and another passage has *ekapadam* in the sense of "in one word," iii. 313. 69.

**Arms and fathom:** Estimated at four or five cubits in later works, the *vyāma*, space between the outstretched arms, is used a few times, but only of trees and sacrificial appurtenances. A bough *daṣavyāma*, ten *vyāmas* long, is mentioned in a repeated phrase, iv. 23. 21, etc., and a *vedī daṣavyāmāyatā navotsedhā*, “ten *vyāmas* long and nine high,” in iii. 117. 12; while the circumference of a sacrificial post, as made in the good old days of marvels, is given as one hundred, *yūpaḥ ṣatavyāmaḥ pariṇāhena*, vii. 68. 12. The divine discus of Kṛṣṇa is *vyāmāntara*, which the scholiast says is “five cubits, the space between the outstretched arms,” *prasāritayor hastayor yāvān vistārah pañcahastamitah tāvat*, v. 68. 2. It may be called in general (cf. *Ṣat. Br.* i. 2. 5. 14, etc.) a sacerdotal measure, not employed in the tables, and, except for the measurement of trees, it keeps this character in the epic.

**Rods and Bows:** Another sacerdotal implement was the *ṣamyā* rod, the cast of which, according to the epic, measures the interval between the altars set up by a very pious man. The rod, according to the scholiast, is pointed at one end and has a thick knob at the other, and is thirty-six thumbs, two and a half statute cubits, in length. When one “sacrifices by the rod-cast,” one goes around the earth sacrificing at intervals, which are measured by the distance a strong man can fling the rod, *ṣamyā* in the epic, or, according to the scholiast, *sampā*, from its fall, *sampatati*. The technical expression is *ṣamyākṣepeṇa* (*vidhinā*) or *ṣamyākṣepāḥ* (*devān yajati*), “sacrifice to the gods by the cast of the rod,” iii. 90. 5; xii. 223. 24; xiii. 103. 28. The only varying usage is found in iii. 84. 9, where a Tīrtha is described as being “six rod-casts from an anthill,” *ṣaṭsu ṣamyānīpāteṣu valmīkāt*, but this is still in a sacerdotal connection. Measure by arrow-casts is confined to estimating time, as will be shown hereafter.

Bows are used for measurement, but the epic examples give no clue to the length, though later authorities reckon this as equal to a staff, *daṇḍa*, or four cubits, which must be regarded as the length of a bow (six feet). In the three epic cases, two forms of the word are used, *dhanus* and *dhanu*: “dragged eight *dhanūṇṣi*,” i. 153. 40; “struck ten *dhanvantarāṇi*,” viii. 83. 9; “land measuring one and a half thousand of bows,” *dhanuṣām*, viii. 88. 10 (cited above, p. 137).

**Yuga :** This is said to be a measure of four cubits. In iii. 296. 10, *yugamātroḍite sūrye*, “when the sun is up a *yuga*” (N. *yugam hastacatuṣkam*), when the matutinal-rites are performed (*kṛtvā pāurvāhnikīḥ kriyāḥ*). I have not found the word elsewhere in this sense, and as a measure it does not appear to be an old term.

**Nalva :** I am not aware that the *nalva* or *nala* is an early term of measurement. In the great epic it is confined to the seventh book and to the mass which I call pseudo-epic, especially to the Harivaṅṣa. It is, further, not in the Rāmāyaṇa in its earlier form but it has been added to it in the later re-writing of that poem. The word epitomizes the gradual growth of the epic. The Bombay text has *nala* and *nalva*, but not without metrical reason for the choice. We find in vii. 70. 16 (the latest addition to the chronicles of kings), *vedīm aṣṭanalotsedhām*, which is repeated in xii. 344. 60. In the former case it is defined by the scholiast as four cubits; in the latter, as a finger, with *tala* as v. l. Again, vii. 156. 58, *mahārathaṁ trīṅṇannalvāntarāntaram*, and, in a scene which in many points is a mere repetition<sup>1</sup> of this, vii. 175. 12, *nalvamātram mahāratham*, which is repeated in 176. 15 (written *nalla* in these two verses in C.), but nowhere else till we get to xii. 29. 143, where, also in the chronicles of the “kings that died,” we find that Pr̥thu Vāinya gave to the priests *hāiraṇyāṅs trīnalotsedhān parvatān ekaviṅṣatim*. It is interesting to see that the Droṇa account of the “sixteen kings,” in adding the sixteenth, has taken from Pr̥thu this laudation and inserted it in the next and last (lacking in Çānti). In vii. 62. 13, the phrase is *hāiraṇyān yojanotsedhān āyatān ṣatayojanam*, giving height and length. In the cases cited it will be observed that *nala* is not simply a *falsche Schreibart* (PW.), but a necessary metrical alteration (*nalla* alone being wrong). In xii. 154. 7, a tree is *nalvamātraparīṇāhaḥ* (where N. defines the measure as *hastānām ṣatacatuṣṭayam*, which removes the doubt expressed in PW. as to *catuḥṣatam*), “four hundred cubits in circumference” (this attributes the greatest circumference to the tallest

<sup>1</sup> It repeats the preceding text, but *adhyāya* 175 is the original. Besides the one *nalva* raised to thirty in 156, we have the *cakra*, which in 175. 46 has still only 1000 spokes while in 156. 77 it has 100,000.

tree known, the *gālmali*). A Kālāmra tree is *yojanotsedhaḥ*, vi. 15 (not a *Dvīpa*, PW., but a tree that gives perpetual youth). A following stanza tells of another wonder-tree, estimated as being one thousand and one hundred leagues tall, which measures the *utsedha* or height from earth to sky, vi. 7. 21. Its circumference is “of *aratnis* one thousand and hundreds ten and five” (2500 cubits).

**Kroṣa :** The *kroṣa*, Anglo-Indian *koss*, which means literally a “scream” and is estimated in later works as two thousand “bows” or a fourth of a *yojana*, is the usual number to indicate travelling distances, not in multiples but always as a *koss*, as if one always went just one *koss* unless he went at least as much as half a *yojana* (rare, ii. 2. 22, *yojanārdham atho gatvā*, in accompanying a departing guest) or a *yojana*, which latter is used for all long stretches. The almost universal use of *yojana* for this purpose rather than two or three *koss* would indicate that the *yojana* was shorter than is usually assumed. It is not often that a *koss* indicates height, but the examples below will show one case of mountains thus measured. For journeys, besides the use of the half-league in the example just given and the league, as in vii. 112. 12, *itas triyojanam manye tam adhvānam . . . yatra tiṣṭhati*, “I think it is a course of three leagues from here (to) where he stands,” we have in the following examples the regular (single) *koss*: iii. 271. 53, *kroṣamā-trāgatān aṣvān*; vii. 99. 9, *rathe kroṣam atikrānte*; ix. 29. 42, *kroṣamātram apakrāntaḥ*; xi. 11. 1, *kroṣamātram tato gatvā*. In other measurements: vii. 103. 37, *tasthāu kroṣamātre samantataḥ*, “at a distance of a *koss* on every side.”

A great archer shoots a *koss*: “He seized several arrows and when he had fitted them to his bow quickly as if they were one, they fell at a distance of a *koss*,” *kroṣamātre nipatanti*, viii. 79. 57; *rathasthito ‘grataḥ kroṣam asyati ṣarān*, vii. 99. 9. Mountains “raised a *koss*” are mentioned in vii. 65. 10, *parvatāḥ kroṣam ucchritāḥ*. Most of the other cases of the use of *koss* are quite as useless in helping to a determination of its real length. They are as follows: For a *koss* on every side around a beleagured city the earth is broken up and mined, *samantāt kroṣamātram*, iii. 15. 16; ponds are of this extent, *vāpyaḥ kroṣasammitāḥ*, vii. 56. 7; the heroine can be smelt up to a *koss*, *gandhaḥ cā ‘syāḥ kroṣamātrāt pravāti*, i. 197. 36; *kroṣāt pradhāvati*, i.

167. 46 (see below on *yojana*). The only passage that seems to cast light on the epic measure is found in xiii. 90. 37, where speaking of the purifying effects of the men “fit for the row” and of the *daśapūruṣa* (çl. 27), that is, a man tenth in descent in inherited Vedic wisdom (one who has nine generations of pious and learned ancestors), the poet says: “They purify as far as they see . . . even one such would purify to a distance of two and a half *koss*,” *yāvaḍ ete prapaśyanti pañktyās tāvat punanty uta . . . kroṣād ardhatrītyāc ca* (above, p. 133) *pāvayed eka eva hi*. Here, as two and a half *koss* are regarded as less than the limit of ordinary ability to see a person, and five and a half miles far exceeds this, it would seem that in the epic the *koss* was not two miles and a quarter but nearer one mile, as is the estimate of the Viṣṇu Purāṇa (which ascribes to it, Colebrooke, *loc. cit.*, four thousand cubits, a thousand bows, against the Āditya Purāṇa’s estimate of eight thousand cubits), or, exactly one mile and one eighth rather than two miles and a quarter. This, however, is based on two surmises, first, that the “even one” clause introduces a restriction applicable also to the distance as less than that previously mentioned, which seems to me legitimate, and, second, that the expression “as far as they can see” means as far as they can see a person (that person becomes pure by being seen). This latter surmise also seems to me to rest on the intended meaning, though it is possible that the expression merely means as far as eyesight can reach, in which case the passage is as useless as the others.

**Gavyūti:** After the *koss* comes the *gavyūti*, estimated by later writers as two *koss*. It is used in the epic to give distance, *gavyūtimātre nyavasat*, “stayed at a distance of four miles,” iii. 239. 29; and, in the bombast of the late book of Droṇa, the battle-array is estimated as extending twelve *gavyūtis* or forty-eight miles, *dirgho dvādaśagavyūtiḥ* (*paścā ’rdhe pañca viśṭṭaḥ*, and twenty in the rear), vii. 87. 22, a statement the more remarkable as the whole battle-field is only five leagues in extent, v. 195. 15. In vii. 87. 14 is found also the expression, *gavyūtiṣu trimātrāsu* (*tiṣṭhata*). The *gavyūti* is seldom used for travellers, but often for stationary extent of hall, camp, and quiescent distance, as in xii. 125. 18, where a deer springs ahead, but stands a *gavyūti* distant, *gavyūtimātreṇa, bānapatham muktivā, tasthivān*. At least, it is not till the



late "house of lac" scene, i. 151. 20, *gavyūtimātrād āgatya*, "coming up to a distance of a *gavyūti*," and in the (also late) scene at (Gorresio) R. i. 79. 27, *gatvā gavyūtimātrakam*, that I find it with a verb of motion. This is doubtless because of its meaning originally a meadow, that is a field or acre, rather than a measure of length. According to Nilakaṇṭha, *goyuta* is the equivalent of *gavyūti*, as used in xiv. 65. 22, *goyute goyute cāi 'va nyavasat*, "he rested (camped) at every *gavyūti*," designating a daily march retarded by the weight of treasure carried. In any case the term is a solecism. A march like this, by the way, is described as being made *kramaṇa*, step by step, "slow march," xv. 23. 16.

**Yojana:** The "yoking" called *yojana*, estimated at two *gavyūti*, four *koss*, eight thousand bows, and consequently sixteen thousand cubits in the Āditya Purāṇa, is reckoned in the Viṣṇu Purāṇa as only half of this distance, that is, as nine miles in the former and four and a half in the latter work (Colebrooke, *loc. cit.*), but in the Mārkaṇḍeya Purāṇa as four *gavyūti* or eight *koss* (*cit. PW.*). I shall render it league. It is the longest measure and is used in estimating extent of length and surface. As the syntactical construction of this word includes that of all the others previously mentioned, I have reserved the subject for this paragraph. The construction varies between adjective compounds in the modifying word, adjective compounds with *yojana*, and accusative (nominative) or ablative of extent, as follows:

i. 30. 23, *sa tataḥ śatasāhasraṁ yojanāntaram āgataḥ kālena nā 'timātreṇa*,

"in a short time he went a hundred-thousand league-interval,"

i. e. a distance (measured by) a hundred thousand leagues.

xiv. 9. 34-35: *sahasraṁ dantānām śatayojanānām . . . daṇṣṭrāḥ catasrā dve śate yojanānām*, "a thousand of hundred-league teeth . . . four fangs two hundred of leagues." i. 175. 43, *tat sāinyam kālyamānam triyojanam*, "the army was driven three leagues;" xii. 170. 15, *itas triyojanam gatvā*, "going three leagues from here."

ii. 7. 2: *viśtīrṇā yojanaśatam śatam adhyardham āyatā . . . pañcayojanam ucchritā*, (a hall, *sabhā*) "one hundred leagues broad, one hundred and fifty long . . . five leagues high;" ib. 8. 2,

*çatayojanā vistārāyāmasampannā bhūyasī cā 'pi*, (a hall) “of a hundred-leagues, complete in breadth and height, and even more”; ib. 10. 1, thus in B:

*sabhā Vāiçravaṇi, rājan, çatayojanam āyatā  
vistīrṇā saptatiṣ cāi 'va yojanā 'tisitaprabhā,*

where C. has *yojanāni sitaprabhā*. C. has the right reading; the construction is “broad, seventy leagues” (in the nominative), and not “seventy were broadened” (leaving *yojanā* to be construed as a Vedic form with *saptatiḥ*), for the construction throughout, as is customary with *vistīrṇa* and *vistṛta*, is to make *vistīrṇā* agree with *sabhā*.

Ordinarily, the accusative, as in *kroçam ucchritaḥ* (above, p. 146), expresses the extent, and this may be assumed to be the construction when the form leaves the case ambiguous, as in the answer to the question, “How long is the road between the world of Yama and the world of men?” (given as) “between (etc., is) eighty-six thousands of leagues,” *Yamalokasya cā 'dhvānam antaram mānuṣasya ca kīdṛçaṁ kim pramāṇaṁ vāi? śadaçītisahasrāṇi yojanānāṁ narādhipa Yamalokasya cā 'dhvānam antaram mānuṣasya ca*, iii. 200. 44 and 46. Here it is clear that the numeral is in the accusative, and it is probably governed, as is *adhvānam*, by *gantavyam*, as in the following: *kiyaḍ<sup>1</sup> adhvānam asmābhir gantavyam imam īdṛçam? etāvad gamanaṁ tava*, xviii. 2. 26 and 28. The locative may take the place of the accusative when the word “way” is used, as in xiv. 27. 3, *kiyaṭi adhvani tad vanam*, “(on) how great a way is that forest?”

I do not find the nominative used to measure distance of movement (evidently because it is impossible to say one goes to a nominative) but only of stationary distance, that is, where no progress toward is implied. For example, one may not say the way is a *kroçaḥ* but only *kroçam* by analogy with “one goes a *kroçam*.” But, as in the example above, one may say a hall is extended so much and use the nominative, because the word extended does not mean goes to that distance; but extended is broad, and this ptc. adj. is equivalent to the noun breadth.

<sup>1</sup> But *kiyantam kālam*, ib. 5. 4. There is a passage, i. 126. 8, where *adhvan* appears as a neuter, *prasannā dīrgham adhvānam sahksiptam tad amanyata* (N. supplies *gamanam*).

So in estimating the (stationary) height of a mountain one says that it is "upraised" so much in a compound preceding, as in *ṣaḍyojanasamucchritaḥ* (*Kāilāsaḥ*), "a six-league-upraised" (mountain), iii. 139. 11; or that it is so many leagues, without anything to indicate that the numeral is not a predicate nominative, as in *trayastrīṇcat sahasrāṇi yojanāni hiraṇmayāḥ*, "golden (Meru is) thirty-three thousand leagues," iii. 261. 8; *yojanānām sahasrāṇi pañca ṣaṇ Mālyavān atha*, "Mālyavat (is) five-six (eleven) thousands of leagues," vi. 7. 29;<sup>1</sup> or that it is "upraised" so many leagues in the nominative, as in

*Meruḥ kanakapurvataḥ . . . sc. tiṣṭhati*  
*yojanānām sahasrāṇi caturaçitir ucchritaḥ*  
*adhasṭāc caturaçitir<sup>2</sup> yojanānām,*

"golden Meru . . . (stands) eighty-four (nom.) thousands of leagues upraised, (and) under(-ground) eighty-four (nom., sc. thousands) of leagues," vi. 6. 10-11.

Further, there is the one construction where, instead of saying that the height or breadth of a mountain is so much, one may employ partitive apposition with (apparently) a nominative (predicate), as in

*aṣṭādaça sahasrāṇi yojanāni, viçāmpate,*  
*ṣaṭ çatāni ca pūrṇāni viṣkambho Jambupurvataḥ*  
*lāvaṇasya samudrasya viṣkambho dviguṇaḥ smṛtaḥ,*

"eighteen thousand leagues and six full hundreds the breadth (is) Jambu-dvīpa, and the salt sea's breadth (is) recorded (as) twice as much," vi. 11. 5-6. The ordinary construction in such a case is to prefix the number, if it is easily managed, as part of a compound, as in *ādityapurvataḥ daçayojanavistāram*, "of ten-league-extent," xii. 328. 23; or to put the dimension in an oblique case, as in

*ekāikaṁ yojanaçataṁ vistārāyāmataḥ samam,*

"each (city was) one hundred leagues (of a league-hundred) alike in respect to breadth and length," viii. 33. 19 (compare *pramāṇāyāmataḥ samam*, of a man, i. 222. 31); but with such

<sup>1</sup> Here occurs a word rare enough in early texts to be noticed, *mahā-rajata* as gold- (colored people). Cf. *JAOS.*, xx., p. 221 for *hiraṇya* as silver.

<sup>2</sup> For the meter, cf. No. 37 in the *Çloka*-forms of my *Great Epic*.

an unmanageable number as that above it is more natural to have the construction of the second part of the sentence a genitive, with the dimension in the nominative.

The locative gives the extent only when this is implied or conditioned by the context, as "on the way" (above) and in *ekādaca sahasrāṇi yojanānāṁ samucchritam, adho bhūmer sahasreṣu tāvatsv eva pratiṣṭhitam*, (Mt. Mandara), "eleven thousand of leagues upraised, and supported on just as many thousands below the earth," i. 18. 3. So "at six-rod-casts from the anthill" (above, p. 144), is only a location of place, not of extension; also *kroçamātre* (p. 146).

Finally,<sup>1</sup> in estimating distance to a certain extent, the ablative may be used with some prepositions to convey the notion of exceeding the limit, or simply, beyond, while the ablative alone or with *ā* indicates the limit itself up to which the distance implied extends. Of the first case an example is found united with the instrumental in

xii. 336. 9, *Meroḥ sahasrāṇi sa hi yojanānām  
dvātriṅcato 'rdhvaṁ kavibhir niruktaḥ*,

"this (white island) is said by the poets (to be) from Meru more than thirty-two thousands of leagues" (by thousands more than thirty-two).

The antique expression *mūlāt*, "up to the root," is used, though rarely, both in this sense and in that of "from the root," that is from the beginning, but it is significant that the epic usually expresses the idea by a compound, as in

*tataḥ samūlo hriyate nadīkūlād iva drumah*,

xii. 95. 21; or it is paraphrased, for example, *na mūlaghātaḥ kartavyaḥ*, xii. 268. 12. Moreover, in words expressing distance, the examples leave it a little doubtful whether the ablative means "from" or "up to," but by analogy with the same phrase with the preposition it would seem that the latter idea was that of the simple ablative. Thus, to express the idea of a smell extending a *koss* we find *kroçamātrāt pravāti* and *kroçāt*

---

<sup>1</sup> Of course I omit idioms which may be translated to give extent without really expressing this, such as *brahmādiṣu tṛṇānteṣu bhūteṣu parivartate*, "pervades all beings from Brahman to grass," iii. 2. 72 (a common phrase).

*pradhāvati* (above, p. 146); *tasyās tu yojanād gandham ājigh-ranta narā bhuvi*, i. 63. 82; *āyojanasugandhin*, i. 185. 21; and, in the province of sight, *yojanād dadṛṣe*, ii. 24. 22; *āyojana-sudarṣana*; and finally, *ā* with the ablative, as in *locanāir anu-jagmus te tam ā dr̥ṣṭipāthāt tadā*, “then they followed him with the eyes up to the limit of their vision,” ii. 2. 26. As with time-words, *yāvat* is also used, *yāvac Carmanvatī*, “as far as the river,” i. 138. 74.

Another reason for taking the ablative as one expressing the limit up to (rather than the origin) is that it thus offers a perfect parallel to the use of the ablative with time-words, for, as I shall show in the next section of this article, the idea of a simple time-ablative expressing the time after which any thing occurs is erroneous, though this is the only explanation of this ablative given by Speyer (and adopted by Whitney). On the contrary, the time-ablative, unless expressly accompanied with *ūrdhvam* or its equivalent in the sense of “beyond,” always indicates time up to the limit expressed by the ablative, and so the extent-ablative indicates the extent up to the limit expressed by this case. With *adhi* the ablative means above, over.<sup>1</sup>

When the name of a dimension is given, it is usually compounded with the number, and this has led Speyer in his excellent *Sanskrit Syntax*, § 54 a), to remark that “when naming the dimension of a thing one does not use this accus. [of space], but avails one’s self of bahuvrīhi compounds.” With few exceptions this is quite correct and as a general rule is perfectly unimpeachable. Thus in iii. 82. 107:

*ardhayojanavistārā pañcayojanam āyatā*  
*etāvati Devikā tu,*

“of half-league-breadth, five leagues long (extended)—such is the size of Devikā.”

vii. 66. 16, *ṣaṭtriṇṇadyojanāyāmā<sup>2</sup> triṇṇadyojanam āyatā*  
*paṣcāt puraṣ caturvīṇṇad vedī hy āsīd dhiraṇmayī,*

<sup>1</sup> I take *yojanād adhi* in C. ii. 619 in this sense, but B. 14. 54 has *yojanāv adhi* (*triyojanāyatam sadma triskhandham y. a.*), and PW. interprets C. as “a Yojana high.” This preposition, by the way, is used (in a way not recognized in PW. or pw.) with gen. of place, in H. ii. 79. 12, *sapatnīnām adhi nityam bhaveyam*, “over my rivals.”

<sup>2</sup> C. has *ṣadvīṇṇad*, čl. 2,349, which inverts the ratio and makes *āyāma*, length, into breadth.

“of thirty-six-league-length, thirty leagues broad (extended), in the rear (and) in front twenty-four (leagues), was the golden *vedī*.”

This arrangement, by which one member is made a compound of the noun of dimension and the other has the participle, is quite a favorite. The following example illustrates it again, together with another illustration of the extent given by a number-word, apparently in the accusative:

xiv. 58. 33, *ito hi nāgaloko vāi yojanāni sahasraṣaḥ*,

“from here the dragon-world (is) leagues by the thousand;”

ib. 37 and 40, *nāgalokaṁ viveṣa ha, dadarṣā nāgalokaṁ ca yojanāni sahasraṣaḥ . . . dvāraṁ sa dadarṣa pañcayojana-vistāraṁ āyataṁ śatayojanam*, “he went to the dragon-world, and he saw the dragon-world, leagues by the thousand . . . and he saw the five-league-size gate, a hundred leagues extended.”

Another example of the exceptional usage, whereby when naming the dimension of a thing one uses the accusative, is given by this case:

xii. 282. 7-8, (*dadarṣa*) *Vṛtraṁ dhiṣṭhitam parvatopamam, yojanānām śatāny ūrdhvam pañcocchritam, arimḍama, śatāni vistareṇā 'tha trīṇy evā 'bhyadhikāni vāi*, “he saw Vṛtra stand like a mountain five hundreds of leagues upraised on high (tall), and three hundred more in extent.”

When two dimensions are given, they may follow adverbially, as in one of the examples above and in xii. 339. 9, *śatayojana-vistāre tiryag ūrdhvaṁ ca*, “hundred-league-extent (peaks) transversely and up,” that is, two peaks having this extent in both directions; for *vistar*, *vistāra* is extent in general (*ākhyānam bahuvistaram*, “a long story,” vii. 52. 37; *śatayojana- and anekayojana-vistirṇa*, of ocean, “leagues broad,” iii. 282. 59 and 45), and may even limit, as a general term, *āyāma*, which is always length, as in (*dviyojanasamutsedhā*) *yojanāyā-mavistarā*, “(two leagues high and) a yojana-length-extent weapon,” vii. 175. 97 (not in C.).

This last sentence (compare also the *nalva* citations, above, p. 145) gives the regular word for height, which is construed in compound form, as here and in i. 29. 30: *śaḍ ucchrito yojanāni gajas tadvigunāyataḥ kūrmas triyojanotsedho daśayojana-*

*maṇḍalaḥ*, "an elephant six leagues upraised and twice as extended; a three-league-height and ten-league-circle tortoise" (in English, three leagues tall and ten round).

#### ON $\pi$ .

Although no word in the epic expresses the relation between the diameter and the circumference, yet this relation is given in figures, as applying to the size of the sun, the moon, and the "planet" that swallows them, the moon being rather larger than the sun.<sup>1</sup> The account of the size will be found at vi. 11. 3 (*Rāhu*); 12. 40 ff.; of the cause of eclipse, i. 19. 9 (*rāhu-mukha*). The relation between the diameter and the circumference differs inversely according to the size of the object, the greatest circle having the smallest ratio. Of the three heavenly bodies, *Svarbhānu* or *Rāhu* (the devouring planet) is circular, *parimaṇḍala*, no less than the moon and the sun, so that  $\pi$  can be established in this case as well as in the others. Its diameter, *viṣkambha* (breadth), is twelve thousand leagues, *yojanas*, and "in its circumference and extent," *pariṇāhena vipulatvena ca*, it is "thirty-six thousand sixty hundred" or 42,000 leagues, as say the Pauranic sages, *budhāḥ pāurāṇikāḥ*. The moon's diameter, *viṣkambha*, is eleven thousand and its circle, *maṇḍala*, is thirty-three (thousand) and "sixty-less-one" (hundreds, given in the text as the *viṣkambha*, but this must be *pariṇāha*, as in the preceding case), making the sum in thousands (33) and in hundreds (59) equal in all to 38,900. The sun in diameter is "eight thousand and two more," *anye*, and its circle is equal to thirty (thousand), *maṇḍalaṁ triṅcatā samam*, and fifty-eight (hundred) in extent, *vipulatvena*, or 35,800. Thus (instead of  $\pi=3.1416$ ):

---

<sup>1</sup> This is not strange. In fact, the full moon in India on a clear night certainly looks larger than the sun even when the latter is on the horizon. Especially at the end of a dusty day; when the moon seems twice the size even of the harvest moon of this country. But this is not the only reason for the great size attributed to the heavenly bodies as compared with that assigned by the Greeks. Even the stars are regarded as huge worlds "because though small as lamps in appearance they are so far removed" (the passage is given in my *India, Old and New*, p. 59, from iii. 42).

Rāhu, 12,000: 42,000  $\pi=3.50$

Moon, 11,000: 38,900  $\pi=3.53+$

Sun, 10,000: 35,800  $\pi=3.58$

There is nothing to indicate that the *yojana* here used is the special astronomical *yojana* of later works. According to the *Sūryasiddhānta*, iv. 1, the sun's diameter is 6,500 (astronomical) *yojanas*, and the moon's is 480, while  $\pi$  in that work is 3.1623 and 3.14136, according to circumstances (Whitney's notes, *JAOS.* vi. pp. 183 and 201). A little later, in the fifth century, Āryabhaṭa (Thibaut, *Astronomie*, etc., p. 75, in Bühler's *Grundriss*) knew that  $\pi=3.1416$ , and it seems grotesque enough that even an epic poet could give such statements as those made above, if he had an approximate notion of the true relation. For it is not as if the author carelessly (poetically) said that the sun's circumference is about three and a half times its diameter. The numbers are given in detail for three different circles and show that the calculation had been made in each case. But any boy with a string and a tree-stump could get nearer to the true ratio than 3.5.

[To be continued.]